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Combined Army Operations at Brigade Level, Realistically Achieved Through Simulation I (COBRAS I): Report on Development and Lessons Learned

Christopher R. Graves, Charlotte H. Campbell, and Daniel E. Deter
Human Resources Research Organization

Kathleen A. Quinkert
U.S. Army Research Institute

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EDGAR M. JOHNSON
Director

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Technical Review by

Frank Humphrey, FXXITP, DTDD
Tom Wilson, FXXITP, DTDD
Gary Parvin, FXXITP, DTDD
Robert Bauer, FXXITP, DTDD
John Hayes, ARI

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Graves, C.R. (HumRRO); Campbell, C.H. (HumRRO); Deter, D.E. (HumRRO); Quinkert, K.A. (ARI)

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U.S. Army Research Institute for the Behavioral and Social Sciences
ATTN: TAPC-ARI-IK
2423 Morande Street
Fort Knox, KY 40121

Human Resources Research Organization (HumRRO)
66 Canal Center Plaza
Suite 400
Alexandria, VA 22314

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14. ABSTRACT *(Maximum 200 words)*:

This report presents the development of the U.S. Army's Force XXI Training Program's Combined Arms Operations at the Brigade Level, Realistically Achieved Through Simulation I (COBRAS I) training program for the brigade staff. The COBRAS I program provides structured, simulation-based training on basic staff skills for conventionally-equipped forces and consists of two types of exercises: a Brigade Staff Exercise for the brigade commander and his staff, and smaller Brigade Staff Vignettes for segments of the staff. The report highlights the program's background and design efforts (e.g., task identification, scenario design), the construction of the training support package (TSP) materials, and the resulting exercises and TSPs; formative evaluation methods and results are included throughout this discussion. The report concludes with a discussion of lessons learned regarding future program development and an introduction to the COBRAS I follow-on effort (COBRAS II) that will enhance the capability of the program to satisfy the U.S. Army's training needs.

15. SUBJECT TERMS

Force XXI Training Program; COBRAS Training Program; Brigade Staff Training; Structured Training; Simulation-Based Training; Training Support Package; Brigade/Battalion Battle Simulation

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Christopher R. Graves, Charlotte H. Campbell, and Daniel E. Deter
Human Resources Research Organization

Kathleen A. Quinkert
U.S. Army Research Institute

Armored Forces Research Unit
Barbara A. Black, Chief

U.S. Army Research Institute for the Behavioral and Social Sciences
5001 Eisenhower Avenue, Alexandria, Virginia 22333-5600

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FOREWORD

The U.S. Army faces the challenges of maintaining combat readiness and preparing for the battlefield of the 21st century. This is an era of budgetary and environmental constraints. In fiscal year 1994, Congress appropriated the funding for the Virtual Brigade Training Program (Department of Defense Appropriation Bill entitled, "Report of the Committee on Appropriations, U.S. Senate, on H.R. 3116," October 1993). Shortly thereafter, the development of this program was assumed by the Force XXI Training Program that is addressing the training of the modern force, and the program was renamed as Combined Arms Operations at the Brigade Level, Realistically Achieved Through Simulation I (COBRAS I).

The COBRAS I project, a research and development (R&D) effort tasked with the development of the COBRAS program, was funded through the Defense Advanced Research Projects Agency and conceptualized by the U.S. Army Research Institute for the Behavioral and Social Sciences and the U.S. Army Armor Center (Memorandum of Agreement [MOA] entitled "Force XXI Training Program [i.e., Virtual Brigade Training Program]," June 1994). The project was to create two types of exercises: vignettes for segments of the brigade staff and a larger brigade staff exercise focusing on the primary staff members plus the staff responsible for combat support and combat service support (CSS) functions. The program was to be modeled after a prototype training program, the Virtual Training Program located at Fort Knox, KY, and focus on staff processes, especially those related to CSS functions, in a structured simulation-based environment.

This report discusses the background of the COBRAS I project and documents the design and development of the resulting training program. The report presents lessons learned for future development efforts. Force XXI policy makers and developers of other programs will find this report useful in guiding the development, implementation, and expansion of structured simulation-based training.

ZITA M. SIMUTIS
Technical Director

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This report summarizes the efforts of a team of military experts, performance analysts, training developers, simulation systems experts, and administrative support personnel. During the course of the 18-month effort to develop the training, some 60 contractor personnel were involved in design, development, implementation, and evaluation. All were staff from four organizations that form the COBRAS Consortium: the Human Resources Research Organization, Hughes Training, Inc., BDM Federal Inc., and PRC Inc.

Additionally, we had invaluable support and guidance from a variety of individuals and government organizations, including:

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  COL Russ Goehring, TRADOC System Manager
- U.S. Army Armor Center
  MG Lon Maggart, Commanding General
  BG Clay Melton, Assistant Commandant
  COL Frederick Treyz, Director, U.S. Army Armor School (USAARMS)
  COL Jerry Veach, Special Assistant to the Commanding General (U.S. Army National Guard)
- Directorate of Training and Doctrine Development
  COL Pat Ritter, Director
  LTC Doug Slater, Chief, FXXI Training Program
  Mr. Gary Parvin, Program Manager, Applied Data Technology Incorporated
- 16th Cavalry, Fort Knox
  COL Don Elder, Commander
- Task Force 2-33 Armor, Fort Knox (LTC Joe Orr, Commander)
- 1st Brigade, 1st ID, Fort Riley (COL Doug Robinson, Commander)
- 3rd Brigade, 2nd ID, Fort Lewis (COL Pete Chiarelli, Commander)
- LTG (Ret.) Frederic J. Brown, Ph.D.

COMBINED ARMS OPERATIONS AT BRIGADE LEVEL, REALISTICALLY ACHIEVED THROUGH SIMULATION I (COBRAS I): REPORT ON DEVELOPMENT AND LESSONS LEARNED

EXECUTIVE SUMMARY

Research Requirement:

In 1995-1996, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) initiated an R&D effort to construct structured simulation-based training exercises for the staffs of conventional mounted brigades. The effort was titled *Combined Arms Operations at Brigade Level, Realistically Achieved through Simulation I*, and is usually referred to as *COBRAS I*. The resulting training program was to consist of two components: a Brigade Staff Exercise (BSE) and brigade staff vignettes.

The BSE was to be a large-scale exercise that integrates the brigade commander and selected members of his staff in a multi-mission scenario that covers the plan, prepare, and execute (including consolidate and reorganize) phases of the missions. The vignettes were to be small group, structured exercises that target two or more members of the brigade staff on specific events occurring during the same missions.

Procedure:

The project kicked off with a design phase in which developers examined the project requirements contained in the ARI statement of work (1994). Subsequent design activities included creating a three-mission (i.e., movement to contact, area defense, and deliberate attack) scenario, identifying training objectives and tasks as performance requirements for the brigade staff, selecting simulations to support the exercises, and conceptualizing the basic exercise architectures.

Of key importance was the development of a task identification methodology, known as the staff performance analysis (SPA). The SPA was developed by the COBRAS team under the oversight of ARI. Its purpose was to identify crucial but undocumented behaviors that are commonly performed and not found in the Army's doctrinal manuals (e.g., Field Manuals and Army Training and Evaluation Program - Mission Training Plans). The implementation of the SPA resulted in a mutually supporting relationship between the scenario design and task identification processes.

Following the design phase, the team began the development of the training support package (TSP) materials. The TSPs were to contain all the information necessary to implement the training, including scenario (tactical) and task materials that had been generated during the design phase, instructional guidance for participants, and electronic simulation materials. The TSP development process required the documentation, in written fashion, of the exercise implementation requirements conceived during the design phase.

The project required a comprehensive formative evaluation of the exercises. This evaluation began with reviews of project objectives and design alternative choices, and progressed into test runs of the exercises during the latter portion of the design phase. The evaluation concluded with exercise implementations called pilots and trials, which were intended to improve the quality and functionality of the training concepts and TSPs.

Findings:

The design, development, and evaluation processes described above combined to produce functional exercises consistent with the project's requirements. Additional products include this report and other documents relating to the development methodology and acquisition of enabling skills in preparation for the COBRAS program.

The BSE provides an opportunity for the brigade commander, his principal staff, and the special staff who serve as links between the brigade and its key combat support and CSS systems to practice their roles during the planning, preparation, and execution phases of a three mission scenario. The BSE utilizes constructive simulation (specifically, the Brigade/Battalion Battle Simulation [BBS]), and is designed according to the principals of structured training. These principals include: (a) a focus on performance of selected critical tasks, (b) standardized exercise control to ensure task performance, (c) standardized feedback to correct and reinforce task performance, and (d) exercise support by means of a comprehensive TSP.

Lessons learned during the project (contained in this report) are organized to assist Force XXI policy-makers as they continue to advance the program, and to aid developers of similar programs. The lessons focus on the development of structured training, the conduct of formative evaluation, and the efficacy of certain COBRAS design characteristics. Other products of the project include a description of the SPA, a report on the integration of multi-media components into structured training, a documentation of the COBRAS tasks (the products of the SPA), and a methodology guide for development of structured simulation-based training programs.

Utilization of Findings:

The results and lessons learned from this effort provide a foundation for future simulation-based TSPs. Force XXI Training Program plans to expand this effort for a larger brigade staff TSP. Additionally the TSP was utilized by the 1st Brigade, 1st Infantry Division at Fort Riley and the 3rd Brigade, 2nd Infantry Division, as part of their training for a National Training Center rotation.

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COMBINED ARMS OPERATIONS AT BRIGADE LEVEL, REALISTICALLY ACHIEVED THROUGH SIMULATION I[1] (COBRAS I): REPORT ON DEVELOPMENT AND LESSONS LEARNED

INTRODUCTION

In 1995-1996, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) initiated a research and development (R&D) effort to construct structured simulation-based training exercises for the staffs of conventional mounted brigades. The effort was titled *Combined Arms Operations at Brigade Level, Realistically Achieved through Simulation*, and was usually referred to as *COBRAS*.

The COBRAS project is just one element of the U.S. Army's Force XXI initiative. Force XXI is the name given to the Army's focus on equipping and training the force of the 21st century. As a part of the Force XXI Training Program (FXXITP) effort, the COBRAS training program was to provide that component of the training for brigade staffs that focuses on the basic staff skills for current conventionally-equipped forces.

The COBRAS training program includes two components:

- The Brigade Staff Exercise (BSE) is a large scale training exercise that integrates the brigade commander and selected members of his staff in a multi-mission scenario that covers all phases of the missions (plan, prepare, and execute, including consolidation and reorganization).
- The Brigade Staff Vignettes are small group, structured exercises that target two or more members of the brigade staff on specific problems or events of a tactical mission. Each vignette is designed for a particular group of brigade staff members and for selected events within the plan, prepare, and execute phases of the missions.

Purpose of the Report

This report documents the development process and lessons learned in order to help architects of future programs make informed decisions. The report has three objectives:

1. to detail the history of the development effort, from the initial conceptualization of the program through the production and trial implementation of the training support package (TSP) materials;
2. to present a comprehensive description of the resulting training exercises, focusing on program design and the structure of the training materials; and
3. to discuss lessons learned from the project, organized to assist Force XXI policy-makers as they continue to advance the program, and to aid developers of other structured simulation-based training programs.

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[1] The COBRAS I project discussed in this report was originally referred to simply as "COBRAS." The "I" designator was added to the title upon the conception of follow-on projects which were titled "COBRAS II" and "COBRAS III." Throughout the remainder of this report, the "COBRAS I" project will be referred to as the "COBRAS" project.

This report is addressed to three audiences: the sponsors of such training development programs, the developers of the training programs, and those policy-makers who oversee, manage, and determine the future course of training.

Organization of the Report

This report is organized in 10 sections:

- *Section 1: Project Background.* Describes the background of the COBRAS project, indicates how the project is embedded in the larger FXXITP, and describes the conceptual foundation of the program in the areas of structured training and leveraged use of simulation.
- *Section 2: Overview of the COBRAS Project.* Describes the COBRAS project objectives and how the work effort was organized and conducted.
- *Section 3: Development Timeline and Formative Evaluation.* Describes the formative evaluation approach, covering activities conducted throughout the project's duration.
- *Section 4: Training Program Design.* Details the design-related aspects of the program, including the scenario, training objectives and tasks, simulation environment, and program architecture.
- *Section 5: Pilot Test of the Brigade Staff Exercise Training Support Package.* Describes the initial external pilot of the BSE and summarizes the findings and TSP revisions.
- *Section 6: Review and Production of the Brigade Staff Exercise Training Support Package.* Describes the final quality assurance review of the BSE, and gives a detailed description of the BSE implementation plan and TSP components.
- *Section 7: Trial Implementation of the Brigade Staff Exercise.* Describes the external trial of the BSE and summarizes the findings.
- *Section 8: Development of the Brigade Staff Vignettes and Training Support Package.* Describes the development of the brigade staff vignettes and includes an overview of the vignette TSP materials.
- *Section 9: Vignette Pilot Tests and Quality Review.* Describes the external pilots of the brigade staff vignettes and summarizes the findings and TSP revisions.
- *Section 10: Lessons Learned.* Summarizes lessons learned that may apply to future training development projects.
- *Section 11: Future Directions.* Discusses a number of issues that should be considered in future development efforts.

Figure 1 shows the correspondence between the eleven sections of the report and the three report objectives.

Report Section	Report Objectives		
	1. Detail the history of the COBRAS development effort	2. Present a comprehensive description of the resulting training exercises	3. Discuss lessons learned
1. Project Background	X		
2. Overview of the COBRAS Project	X	X	
3. Development Timeline and Formative Evaluation	X		
4. Training Program Design	X	X	
5. Pilot Test of the Brigade Staff Exercise Training Support Package	X	X	
6. Review and Production of the Brigade Staff Exercise Training Support Package	X	X	
7. Trial Implementation of the Brigade Staff Exercise	X	X	
8. Development of the Brigade Staff Vignettes and Training Support Package	X	X	
9. Vignette Pilot Tests and Quality Review	X	X	
10. Lessons Learned			X
11. Future Directions			X

Figure 1. Correspondence between the 11 report sections and the three report objectives.

SECTION 1: PROJECT BACKGROUND

This section discusses the historical and conceptual foundations that led to the delineation of the training need and the initiation of the COBRAS project. Two major topics are presented:

- *Force XXI and the Training Need*: The historical perspective focuses on the formulation of the Force XXI concept, which defined the training need.

- *The Training Prototype: The Virtual Training Program*: The conceptual approach to development is known as structured simulation-based training. The prototype is found in the Virtual Training Program (VTP). That landmark program will be described, along with a discussion of the methodology for training development that grew out of the program.

Force XXI and the Training Need

Military forces of the 21st century will face challenges very different from those of the Cold War years. New threats predominate, mission requirements are changing, force projection is replacing forward stationing forces, and new warfighting technology is transforming the battlefield. At the same time, troop ceilings are falling and financial (and environmental) considerations are curtailing training opportunities.

After Operation Desert Storm, lessons learned concerning advances in warfighting technology spurred Army leaders to visualize new concepts relating to tactics as well as command and control (C2) (Johnston, 1994). To capture these visions and respond to the challenges identified above, the Army established a far-reaching approach to carry its forces into the future. The approach is known as Force XXI (Sullivan, 1994) and it has at its core a redesign of the Army to leverage information age technologies.

The U.S. Army Training and Doctrine Command (TRADOC) Pamphlet (PAM) 525-5, *Force XXI Operations* (TRADOC, 1994), proposes that Force XXI organizations and operations will allow the force to operate effectively in the full range of operational environments. The achievement of this goal, however, will require well trained soldiers who can "...adapt tactics, techniques, procedures, and organizations to meet future requirements" (p. 3-1). The force of the future will use a mix of active and reserve units, while reducing the demand for human resources by employing digitized equipment. It will be situationally flexible in terms of its organization, which will be continental U.S. based and prepared to execute all types of military operations (Johnston, 1994).

In 1994, the Mounted Warfighting Battlespace Lab initiated an Army Warfighting Experiment (AWE) at the National Training Center (NTC) entitled Desert Hammer VI. The purpose of the AWE was to determine the extent to which the use of automated command, control, and communication (C3) devices would improve performance. Several lessons learned from Desert Hammer VI (Department of the Army [DA], 1994) directly influenced the course of the Force XXI effort:

1. The application of digitization requires modifications of the tactics, techniques, and procedures (TTP) that must be addressed by unit standard operating procedure (SOP).

2. Leaders must be proficient in the use of digital equipment, confident in the equipment capabilities, and able to process large amounts of information.

3. The approach taken to training units in digitized operations must include training on combat fundamentals.

It is in the third lesson that this project has its roots. Before the transition from conventional to digitized systems and organizations could be achieved, Force XXI leaders saw the need to strengthen conventional combat skills with an emphasis on C3.

Army leaders recognized that building a fundamentally sound combat force ready to push forward into 21st century digitally-based operations would require an extensive and focused training effort. In the face of reduced monetary and personnel resources, they looked to "virtual training"[2] to help meet the challenge. Virtual training would offer advantages over conventional institutional and field training by providing realism while optimizing training time to allow focus on training objectives. The vision for virtual training programs was that they would complement institutional training and live field training exercise (FTX) training in preparing soldiers for the demands of future missions, organizations, and weapon systems.

The first prototype of virtual training was the VTP.[3] This ARI-sponsored developmental effort for the Army National Guard (ARNG) was already in progress when the Force XXI training need was being formulated, and was nearly completed by the time the COBRAS project began. Because of its influence on both the process and the products of this project, a brief overview of the VTP is provided below.

The Training Prototype: The Virtual Training Program

In 1993-1995, ARI sponsored an R&D effort to construct structured simulation-based training exercises for multiple echelons of the armored force. The finished program is known as the VTP. The VTP was developed for the use of ARNG units, to provide them with high-quality, time-compressed structured training in virtual and constructive environments (Hoffman, Graves, Koger, Flynn, & Sever, 1995). Both offensive and defensive exercises are included for the battalion- and staff-level (armor battalion, battalion task force [TF], and battalion staff), company-level (armor company, company team, and cavalry troop), and platoon-level (armor platoon,

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[2] "Virtual training" refers to the use of simulations to represent situations and environments. It should not be confused with "virtual simulation" nor should it exclude "constructive simulation," both of which are defined later in this section.

[3] The program was originally known as the Reserve Component Virtual Training Program (RCVTP). As Active Component (AC) units and institutional training managers became interested in using the program, the "Reserve Component" (RC) designator was dropped.

mechanized infantry platoon, and scout platoon).[4] The staff exercises use constructive simulation as the behind-the-scenes driver; all other exercises are implemented using virtual simulation.

The VTP incorporates four of the training design concepts recommended by Brown (1991):

- Compressed training: The VTP increases training efficiency by reducing both unit preparation time and support personnel requirements. Preparation time is reduced by providing prepared tactical materials, multimedia preparation guidance, and a set of comprehensive administration and implementation materials. Additionally, a dedicated observer/controller (O/C) team provides administrative guidance, exercise control, and performance feedback. The O/C team is an integral component of the program.
- Distributed training: The VTP materials include preparation and take-home materials for the training unit, allowing them to accomplish much of their work at their home station before coming to the simulation facility. Although the program was designed specifically for use at the Mounted Warfare Simulation Training Center (MWSTC) at Fort Knox, it has also been exported to other Simulation Network (SIMNET) sites (Alluisi, 1991) and Janus (Department of Defense, 1995) sites where it is under the control of trained O/Cs.
- Modernized training support: The program leverages existing simulation technologies and multimedia training aids. Continuing efforts have ensured that the VTP is sustained as necessary to take advantage of upgrades to the simulation systems themselves.
- Focus on critical tasks: Every aspect of the program is designed and developed to achieve the goal of focusing the unit on improving their execution of critical tasks.

The two key elements of the VTP that enabled the achievement of these goals are structure and simulation. Each, alone, is a powerful training tool, but together they provide a significant advantage in focusing training on objectives. The discussions that follow provide definitions and background on the concepts of structured training and simulation-based training.

Structured Training

Structured training is a term applied to training programs that are deliberately and purposefully constructed so as to focus on specific training objectives (Campbell, Campbell, Sanders, Flynn, & Myers, 1995; Campbell & Deter, in preparation). The concept incorporates several key features, as shown in Figure 2:

- a focus on performance of selected critical tasks,
- standardized exercise control to ensure practice of the tasks,
- standardized feedback to correct and reinforce performance on the selected tasks, and
- exercise support by means of comprehensive training materials (the TSP).

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[4] A later expansion to the VTP added brigade staff exercises, execution only, in a constructive simulation environment (*Simulation-Based Mounted Brigade Training* [SIMBART] project; described in Koger, Long, Britt, Sanders, Broadwater, & Brewer, 1996), as well as exercises for an additional mission (*Simulation-Based Multiechelon Training Program for Armor Units - Battalion Exercise Expansion* [SIMUTA-B] project; described in Graves and Myers, 1997).

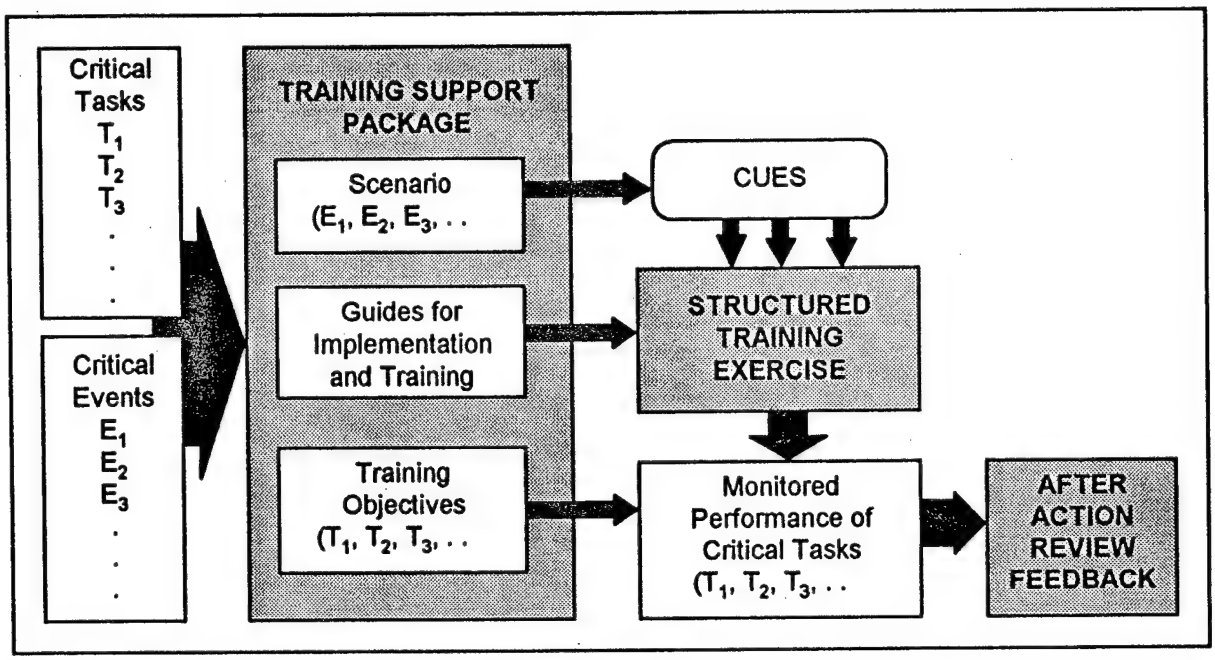

Figure 2. The structure of structured training.

The focus, standardization, and TSP construction are all incorporated in the methodology described in the ARI-published guides (Campbell et al., 1995; Campbell, Deter, & Quinkert, in preparation). There are four phases to the development methodology, as shown in Figure 3.

In Phase 1, developers specify the training requirement in terms of the content (e.g., mission and enemy type, terrain, time constraints, number of exercise start points, difficulty level), training audience (e.g., unit type or echelon, personnel within unit), and appropriate training environment (i.e., specific simulator/simulation).[5]

Phase 2 and Phase 3 are usually concurrent activities, with a great deal of interaction between specifying the training objectives for the stipulated mission, and designing the scenario to prompt performance of the training objectives.

Finally, in Phase 4, developers construct and try out all of the written and simulator/ simulation-based components of the training program, including materials for the trainers and for the participating unit. These materials are referred to as the TSP, which is critical to ensuring standardized implementation. A TSP for a structured training program incorporates the following design aspects:

- closely defined conditions that provide the setting for the training and are crafted to be realistic for task performance;
- carefully defined training objectives that are doctrinally correct, whether or not they are drawn directly from published doctrinal documentation;

[5] Phase I activity might also include determining the training objectives to the extent that their identification is part of the initial needs analysis.

- leveraged use of simulators/simulation that takes advantage of and works within the system capabilities;
- training materials that support all aspects of the training so that the unit's focus is on participating in the training, rather than on designing and developing the training, or on observing and evaluating their own performance; and
- involvement of performance observers and materials to assist them in coaching, observation, and feedback.

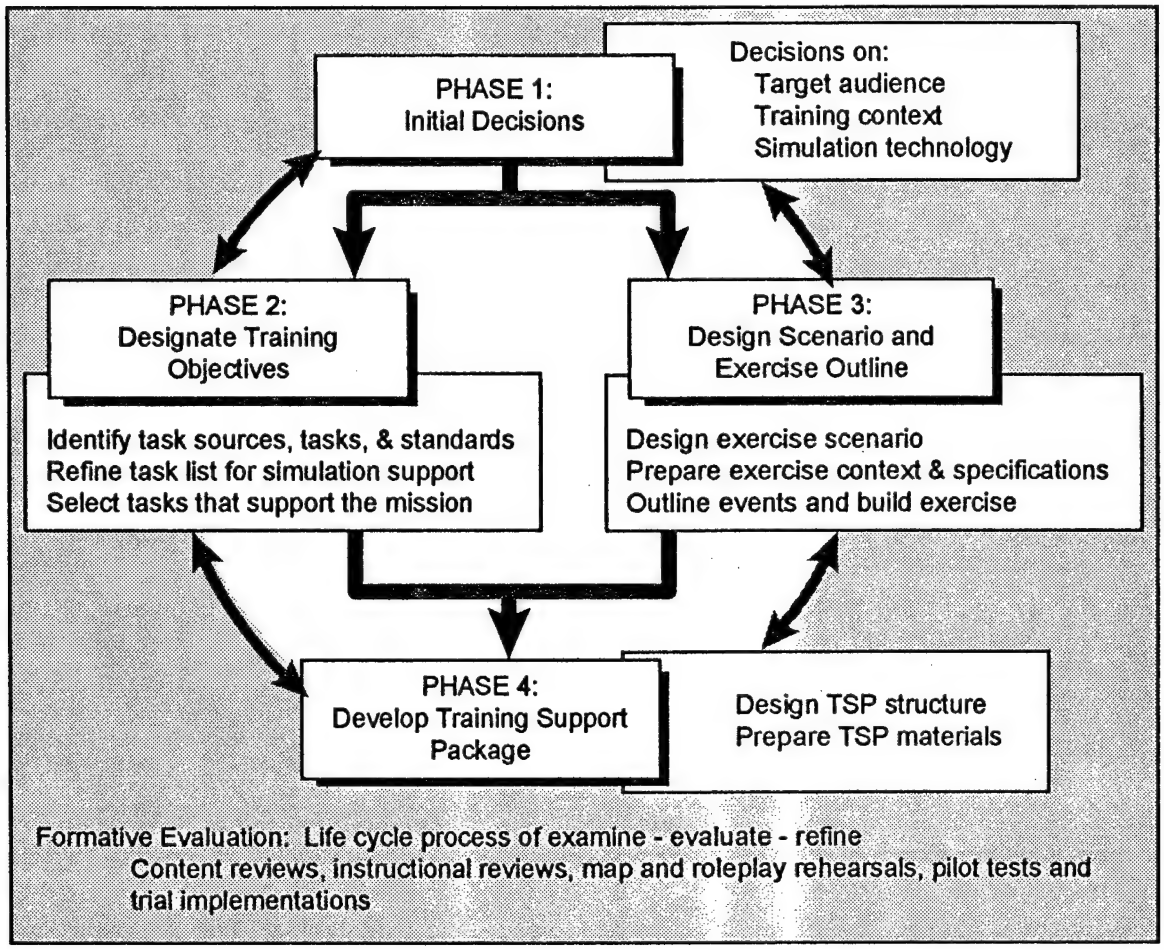

Figure 3. The methodology for development of structured simulation-based training.

The entire design and development process is supported by formative evaluation activities. These include, but are not limited to, trial implementations of the emerging program and TSP. Formative evaluation is considered to be a continuous product improvement process that extends throughout the life of the development effort.

Structured training need not be simulation-based, but it must be standardized. Standardization is critical in order to guarantee the opportunities and cues for the user to perform the selected tasks. Simulation adds the element of control that permits developers and users to

work within a standardized implementation of the training. The following section provides an overview of the simulations available to training developers.

Simulation-Based Training

Simulation is usually considered to fall into one of three categories:

- In constructive simulations, units or vehicles are represented and manipulated on a computer map screen. Simulation operators enter commands into the system, causing the simulated vehicles or other systems to "react" according to programmed algorithms. The simulation operators may be the primary training audience, but generally serve as an interface and training aid between the simulation and the training audience, communicating the activity in the simulation world to the trainees by radio or other message form.
- Virtual simulations represent systems in which a computer-based component replicates or reproduces, to the extent possible, the real physical environment. Images and sounds combine to generate the sensation that one is performing in and interacting with the real environment. Training audience members control the simulation directly, but they do so by performing as they would on actual equipment.
- Live simulations can be thought of as "non-technology-based simulation." While they are not "real," in that the training audience is not really on a battlefield, they do use "real" props, such as radios, maps and overlays, and so on. In general, live simulation exercises use some degree of scripted or prepared information instead of computer-generated information to reproduce the simulated environment.

Technology-dependent simulation-based training has been in use for many years, and has reached a level of maturity that allows for a substantial contribution to training development. Simulation-based training has been used to provide individual skill training, as well as collective tactical and maneuver training for armor and mechanized infantry vehicle crews to brigade, corps, and division staffs. Some of the most widely used simulations include:

- SIMNET, a virtual simulation best employed for maneuver training for vehicle crews, platoons or sections, companies, and, in a limited way, battalions (Alluisi, 1991; U.S. Army Armor School [USAARMS], 1989);
- Modular Semi-Automated Forces (ModSAF), a constructive simulation that interfaces with SIMNET to represent automated forces (Lockheed Martin Advanced Distributed Simulation, 1996);
- the Brigade/Battalion Battle Simulation (BBS) and the Corps Battle Simulation (CBS), constructive simulations best employed to train battle staffs in the C2 aspects of tactical maneuver training, with a particularly realistic representation of combat support (CS) and combat service support (CSS) functions and effects (National Simulation Center [NSC], BBS General Support Team, Logicon Technical Services, Inc., & U.S. Army Communications Electronics Command, 1994); and
- Janus, a constructive simulation that is best employed to train battalion and brigade staffs in the oversight of tactical maneuver operations (NSC, 1994).

Other simulations that are under development include reconfigurable simulators that are similar to and will work in conjunction with SIMNET; the Close Combat Tactical Trainer simulation (CCTT; the Army's virtual training system), scheduled for fielding in 1997-1998 (U.S. Army Armor Center [USAARMC], USAARMS, U.S. Army Infantry Center, & U.S. Army Infantry School, 1995; Sherikon, Inc., 1995); and Warfighter's Simulation (WARSIM) 2000 still in the design stages (NSC, 1996). The development of these new simulations, in combination with the existing systems, all but promises the continued use of simulation-based training for Force XXI.

The simulation development effort is not only concerned with refining existing technologies. Gorman (1991) has stated that the military's simulation technologies must be interconnected, both conceptually and physically, to establish an environment for training the full range of combat skills. He asserted that technologies that are innovative, flexible, and cost-effective are necessary to keep the U.S. military ready to respond to new threats and missions while containing training costs.

Recent advances in simulations have demonstrated the feasibility of linking different simulations by means of distributed interactive simulation. In distributed interactive simulation, electronic communication links between two or more simulations or simulators are established. These links allow troops performing in the context of one simulation to interact directly with troops performing within the context of another simulation, thereby facilitating a joint training environment and experience. Currently, the only operational link is that between SIMNET and ModSAF. On the horizon, however, are links between SIMNET and Janus, and SIMNET and BBS/CBS. These links have undergone initial tests within the past year (Copeland & Lasch, 1997), and although technological problems were experienced, the concept remains viable.

Structure and Simulation

No simulation or simulator, regardless of its advanced technological features and capabilities, can of itself ensure effective training. To fully leverage the efficient employment of these technologies, systematic methods for analysis, design, development, and implementation are needed. The concept of "structured training" satisfies this requirement, and was operationally defined by the VTP itself. As evidenced by the VTP, the combination of structure and simulations provides a powerful approach to delivering training.

For these reasons, one of the requirements for the COBRAS training program exercises was that they be modeled on the VTP in terms of the developmental methodology and the design of the TSP. Like the VTP, the COBRAS program was to be both structured and simulation-based, with a comprehensive TSP to permit standardized implementation.

Summary

This section has described the foundations of the COBRAS project, in terms of the Force XXI training need and the prototype of virtual training, the VTP. It has also provided background information on the concepts of structured training, simulation-based training, and the methodology for developing training that is both structured and simulation-based.

The following section discusses the origins of the COBRAS project. The R&D objectives are described, and a brief synopsis of the program design is presented.

SECTION 2: OVERVIEW OF THE COBRAS PROJECT

The previous section discussed the conceptual and historical foundations that led to the creation of the COBRAS requirement and project. This section describes the project initiation, and also gives an overview of the program design. Four major topics are discussed:

- *Initiating Activities for the Project:* The decisions and actions taken by Congress and other government agencies to establish the project are documented.
- *Project Objectives:* The overall objectives for the project, as stated in the government statement of work (SOW) (U.S. ARI, 1994), are presented. These objectives formed the initiating contractual requirements for the project.
- *Project Design Synopsis:* Early analysis and elaboration of the project objectives led to a basic design outline that served to guide more detailed analysis and design activities. The design outline, as it existed early in the project, is also presented.
- *The Project Team Organization*: This discussion describes the areas of expertise found on the newly formed COBRAS project team, and portrays their major roles, responsibilities, and interactions in support of the program development.

Initiating Activities for the Program

In early 1994, with the support of the Senate Appropriations Committee, the U.S. Army was directed to ". . . expand the existing simulation facilities at Fort Knox, develop a training strategy, use it to enhance the readiness of the 194th Separate Armored Brigade (SAB), and evaluate the effectiveness of these simulations and this new strategy" (Congressional Record, 1994). The 194th SAB, as the operational beneficiary of the R&D effort, was designated as the "Virtual Brigade," and the training program was known as the "Virtual Brigade Training Program" (VBTP). Congressionally-identified funding for the VBTP was provided through the Defense Advanced Research Projects Agency to ARI - Armored Forces Research Unit (AFRU) at Fort Knox.

Almost immediately, the Army expanded the goals and redesignated the VBTP as the FXXITP. The program no longer focused on increasing the training efficiency and effectiveness of a particular unit (i.e., the 194th SAB). Instead, it was seen as an Army-wide program for integrating virtual, constructive, and live simulation-based training into the Force XXI plan for enhancing combat readiness.

In mid-June, 1994, a Memorandum of Agreement (MOA) was signed between ARI (Dr. Edgar M. Johnson, Director) and the USAARMC (Major General [MG] Larry Jordan, Commanding General) that established the basis for the VBTP (by then a part of the Force XXI effort). The SOW for "Development of Training for the Virtual Brigade" (U.S. ARI, 1994) was written by ARI scientists at the AFRU at Fort Knox. The Technical Response (The Human Resources Research Organization [HumRRO], 1994) to the SOW was written by the contractor consortium[6] and approved by ARI, and the contract effort began in January 1995. Shortly

[6] The contractor consortium included HumRRO as the prime contractor, Hughes Training Incorporated, BDM Federal Inc., and PRC Inc.

thereafter, the VBTP designator was dropped from the project title, and the project was renamed as the "Force XXI Training Program for the Conventional Mounted Brigade."[7]

Project Objectives

The objectives for the training program were provided by the SOW (U.S. ARI, 1994), as well as through post-SOW decisions made among ARI, the USAARMC, and the contractor team. The technical objectives, which described the expected outcomes of the project as well as a general methodology for production, were as follows:

1. To develop a training aids, devices, simulators, and simulations (TADSS) based program for training AC brigade staffs, to include CS and CSS functions that directly support maneuver planning, preparation, execution, consolidation, and reorganization. This training is to incorporate simulation facilities at Fort Knox, including (but not limited to): Janus, BBS, and the SIMNET facilities at the MWSTC. The TSP materials are to include (but are not limited to): (a) tactical materials, (b) unit preparation materials, (c) trainer materials, and (d) simulation system materials.
2. To conduct formative evaluations of the initial implementation of the program. This effort will include: (a) development of appropriate program evaluation criteria and instruments, (b) collection and analysis of data, and (c) assistance to users in the initial implementations of the program.
3. To refine the training program based on the results of the formative evaluations. This objective includes the resolution of implementation problems and the documentation of methods and lessons learned for developing extensions of the training program.

Project Design Synopsis

As the three overall objectives were analyzed and elaborated, additional detail was added to the plan. This synopsis provides an overview of the program to be developed--the types of exercises that were to be developed, the characteristics of the program's tactical scenario, the program's instructional design characteristics, and the project documentation.

Exercise Types

The SOW (U.S. ARI, 1994) directed that the project was to create two types of exercises (i.e., a BSE and vignettes) that were distinguished by the scope of their focus.

- The BSE was to be a large scale training exercise integrating the brigade commander and selected staff members in a multi-mission scenario that covered all phases of the missions (plan, prepare, and execute, including consolidation and reorganization).
- The vignettes were to be small group structured exercises that targeted two or more members of the brigade staff on specific problems or events of a tactical mission. Each vignette was to be designed for a selected event or set of events occurring within the plan, prepare, and execute phases of mission conduct.

[7] One more name change occurred in the spring of 1995, when the current program title and its acronym, COBRAS, came into common usage.

The Tactical Scenario

Both the BSE and the vignettes were to be based on a single scenario. In this scenario, a conventional mounted brigade was to be opposed by a Krasnovian enemy, operating within the conventional Soviet-style threat specifications described in TRADOC PAM 350-16 (1994) and U.S. Army Combined Arms Center (CAC) & Fort Leavenworth PAM 350-16 (1994).

The scenario was to include the conduct of three missions: movement to contact (MTC), area defense (AD), and deliberate attack (DATK); all missions would be conducted on NTC terrain. Each mission was to include the conduct of the plan, prepare, and execute phases of the mission in order to allow for a focus on CS and CSS operations.

Finally, the scenario was to be congruent with that of the brigade-level expansion of the VTP, which was being developed in the SIMBART project concurrently with the COBRAS project. Congruence meant that the scenarios would share the same division order, and therefore, the same organization, equipment, terrain, mission timeline, and intelligence information. The requirement for congruence was tempered by an explicit acknowledgment by ARI that the two programs had different objectives, so that complete congruence (i.e., identical scenarios) was virtually impossible.

As stated above, the BSE would cover virtually all aspects of the scenario within a continuous storyline, while the vignettes would focus on slices of the scenario to draw attention to discrete events and staff subgroups. It was intended that the total time to conduct a vignette, including the after action review (AAR), would not exceed four hours, although the guideline was later relaxed for two of the vignettes.

Instructional Design

Guidance related to instructional design included exercise time allocation, exportability requirements, and training audience composition. Consistent with the requirement for congruence, each mission was to consist of an execution phase of approximately three hours. However, given that both types of exercises would focus to a great extent on planning and preparation, total exercise lengths were expected to exceed the three hour execution-only time.

Unlike the VTP, the COBRAS exercises were to be completely exportable, and implementable without the benefit of a dedicated O/C team. This meant that all participants, including O/Cs, would come from within the training brigade or its division, or from a sister brigade. It also meant that the TSP would be completely self-contained, requiring no contractor support team to explain how to implement the program.

Finally, the target training audience for both types of exercises (BSE and vignettes) was to include the following:

- the brigade commander;
- the brigade primary staff, including the executive officer (XO), adjutant (S1), intelligence officer (S2), operations and training officer (S3), supply officer (S4), and the fire support officer (FSO); and
- the key individuals that link the brigade to four of its systems (fire support, air defense, engineer, and logistics).

Together with the technical objectives stated earlier, these requirements drove the program design and development efforts.

The Training Support Packages

For the BSE, the final training program deliverable to ARI was to include a complete TSP covering all three missions, with guidance for all participants. In addition to the primary training audience (selected brigade staff), other participants would include personnel representing the brigade's supporting and subordinate units, a division response cell (DRC) and opposing forces (OPFOR) cell, simulation system interactors, and exercise management team. The TSP would include complete simulation documentation and initialization tapes, complete tactical materials including orders and overlays, and instructional and job aid materials.

Twelve vignettes were to be developed. Each would be an independent, short exercise focusing on a discrete event and a subgroup of the brigade staff (two or more people). Complete instructions for use and implementation of vignettes would provide information and job aids to make conduct of the vignettes flexible and accessible for units. As with the BSE, all simulation and tactical materials would also be included. To the extent that technology-based simulation enhanced training value, the vignettes would be designed for an appropriate simulation environment. The TSPs for simulation-based vignettes would also include support personnel materials.

Documentation

The project was also expected to produce four reports in addition to this report on development and lessons learned:

- a research plan,
- a design report,
- an expanded or revised methodology for development of structured simulation-based training, and
- a report on recommendations for acquisition of enabling skills in preparation for vignette usage.

The Project Team Organization

The team formed to perform the design and development work included staff from all four organizations of the contractor consortium: HumRRO, Hughes Training, BDM Inc., and PRC Inc. Staff members included experts in four areas: brigade operations and functions, performance analysis, training development, and simulations systems. These were complemented by a support staff for word processing, graphics, office systems management, and overall project management.

The overall organization of the team members was fluid and changed continually over the course of the project. Work teams comprising representatives of each of the four areas of expertise were formed to address various training design and development requirements. Figure 4 indicates the focus of each area of expertise and the common focus between areas.

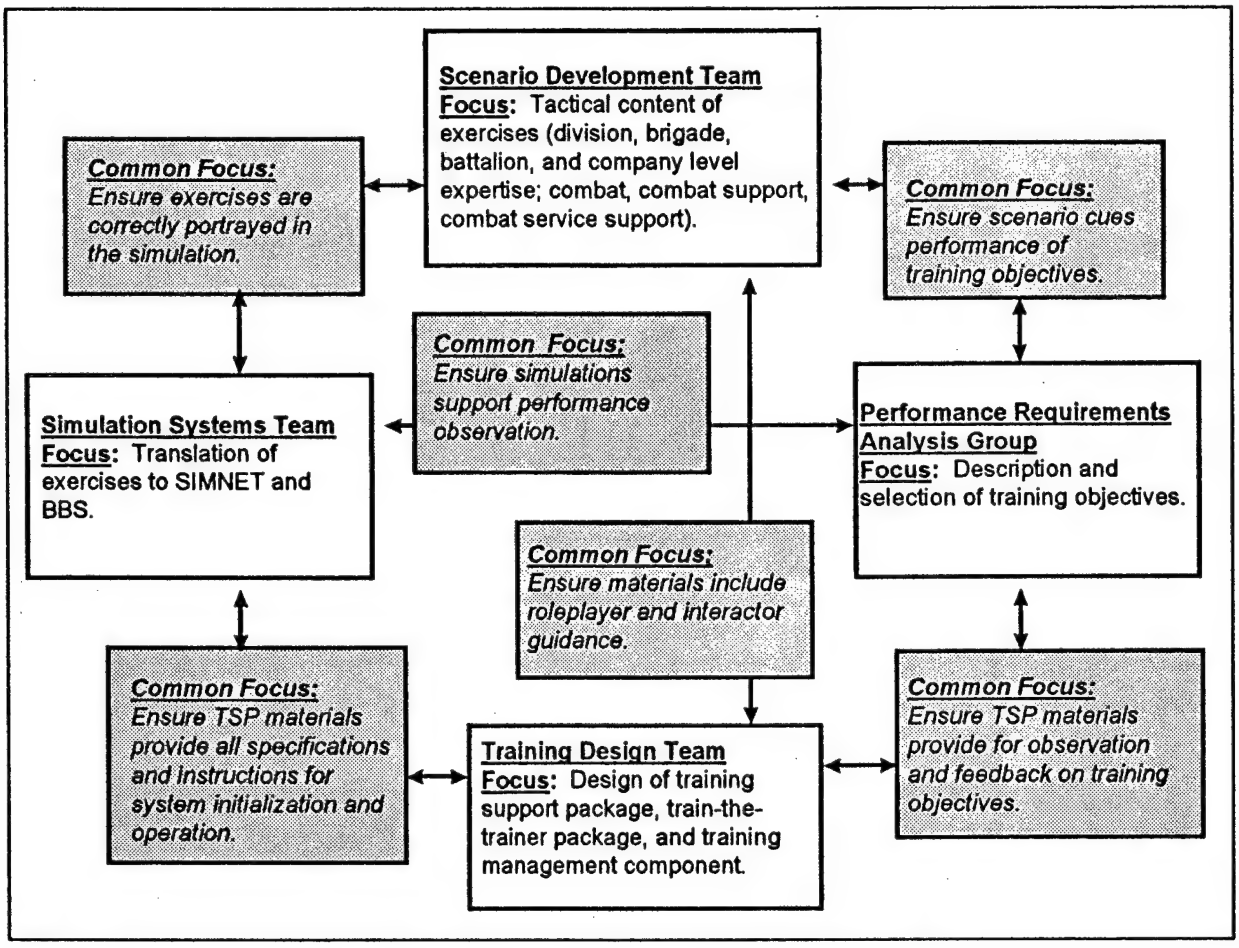

Figure 4. COBRAS Team areas of expertise and focus.

Using the VTP as an initial model and the structured simulation-based methodology (Campbell et al., 1995) as a guide, the project staff began its analysis of the R&D requirement, as presented in the SOW (U.S. ARI, 1994). The first project requirements were that the team produce two documents. The project research plan (HumRRO, HTI-Link Division, BDM Federal Inc., & PRC Inc., 1995a) clarified the COBRAS team's understanding of the project's scope and objectives, and the project design report (HumRRO, HTI-Link Division, BDM Federal Inc., & PRC Inc., 1995b) documented the expected project development activities. These two documents served to guide the COBRAS program design process.

Summary

This section has described the project's initiating activities, the program objectives, and the design characteristics of the COBRAS program at the outset. The next section will describe the project's development timeline and formative evaluation approach. Section 4 will then detail the initial analysis and design activities that defined the training objectives, scenario, simulation environment and exercise architectures for the training exercises.

SECTION 3: DEVELOPMENT TIMELINE AND FORMATIVE EVALUATION

An integral and critical aspect of development was the formative evaluation. In the context of structured training development, "formative evaluation" means an ongoing cycle of examine-evaluate-refine. The evaluation activities were conducted throughout every phase of design and production. The program's evaluation plan was designed to ensure that each component of the BSE and vignettes was functional, doctrinally correct, and consistent with other components, as development proceeded.

This section includes two major topics:

- *Development Timeline*: This discussion describes the timeline for development and formative evaluation of the program components.
- *Formative Evaluation Approach*: Details of the formative evaluation approach and the activities that took place during each phase of development are presented.

Development Timeline

As described in Section 2, the project followed the methodology for development of structured simulation-based training. The methodology is not a strictly linear procedure, but rather anticipates considerable modifications to plans as further development continues. A timeline of the design and development process is shown in Figure 5.

The first phase of the project, to delineate the initial decisions and expectations, was completed during the first 4 months of the project. This included work with the VTP developers who were working on the VTP's brigade staff exercise (described in Section 4), and development of the process for determining the training objectives (also discussed in Section 4). Although defining these initial decisions was an important first step, each of the decisions was revisited throughout the project.

The actual development of the COBRAS scenario and delineation of the training objectives took the full attention of the project staff for the next eight months. While many of the items that would eventually be contained in the TSP were being drafted during this time, the focus was on the more basic conceptual aspects of the training program. Proofing of the scenario and the training objectives proceeded in concert, as described in Section 4.

The first test of the BSE training concept occurred during months 11 and 12, when members of the 16th Cavalry Regiment, Fort Knox, participated in a pilot test of two of the missions. The pilot test enabled project staff to try out and get feedback on various scenario and TSP components, and to evaluate the need for changes or additional components. The pilot tests were followed by intense internal reviews of all of the program materials, with the assistance of ARI and Force XXI military personnel. The BSE pilot test and review are described in Section 5.

The BSE received another significant evaluation after the project was considered finished, among members of the 1st Brigade, 1st Infantry Division (Mechanized), Fort Riley (described in Section 7). The feedback and evaluation results were used in preparation of the second-generation COBRAS TSP, described in Section 11.

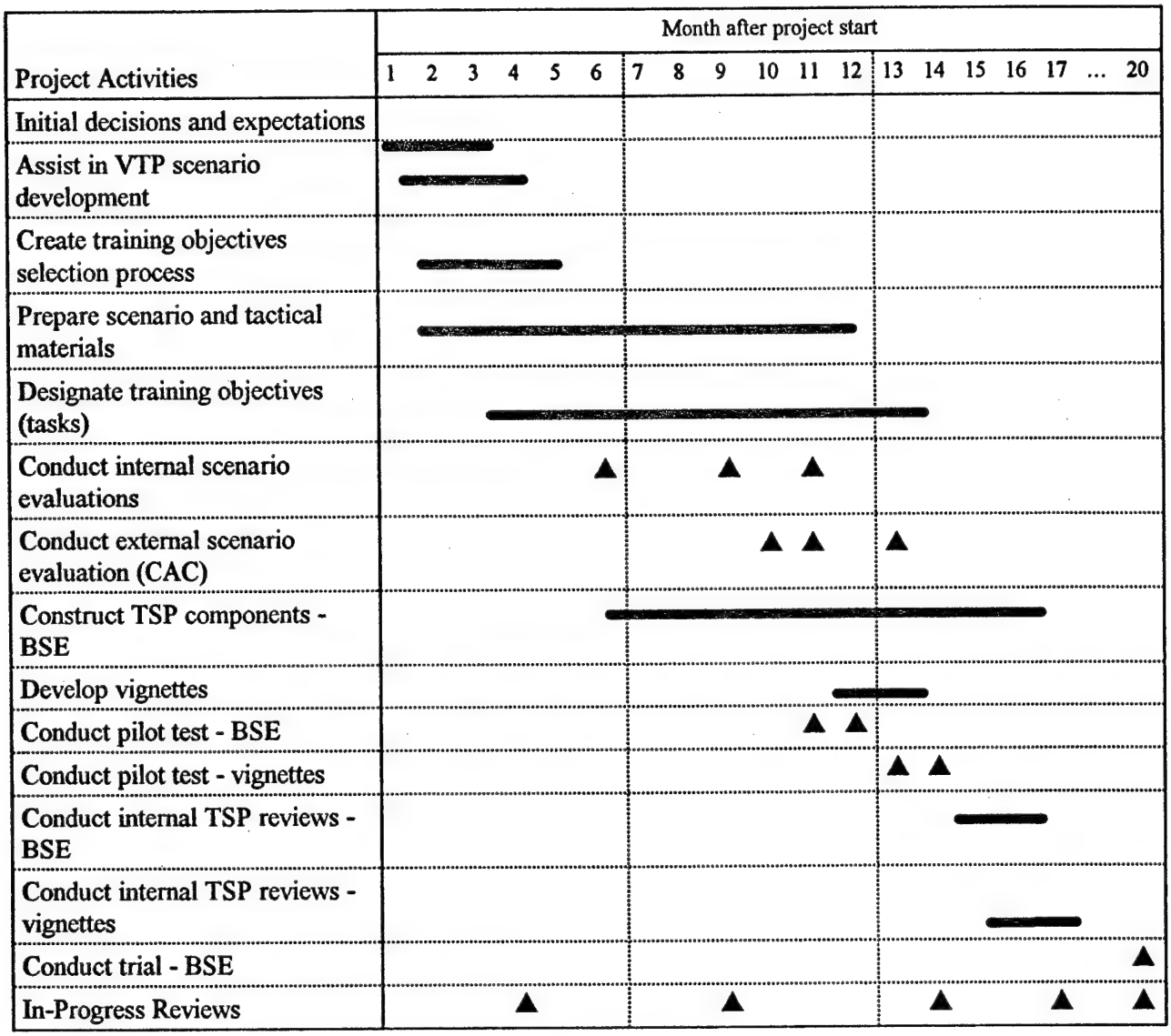

Figure 5. Timeline of the design and development process.

Work on the vignettes began in earnest in the 11th project month, after the BSE was well along in development. External assistance for the vignettes was again provided by the 16th Cavalry Regiment, during months 13 and 14 of the project. As with the BSE, the pilot tests were followed by close scrutiny of all of the vignette TSP components by members of the project staff. Vignette development work and pilot tests are described in Sections 8 and 9.

A series of eight in-progress review (IPR) sessions was used to keep ARI and USAARMC leaders apprised of the project's progress and anticipated obstacles. By means of these IPRs, the project received guidance and direction from various stakeholders, and was able to coordinate with other ongoing efforts.

Formative Evaluation Approach

The evaluation method for the COBRAS program was based on the formative evaluation process outlined by Herman, Morris, and Fitz-Gibbon (1987), modified to be consistent with the

method used in the creation of the VTP (Hoffman et al., 1995). A "formative evaluation," is one that occurs not after a project's completion, but during the development and initial implementations of the program.

The formative evaluation began informally as the COBRAS team conducted expert assessments of early draft concepts and materials. These early evaluation activities were primarily internal to the development team, with ARI briefings and guidance at critical decision points. As development efforts proceeded, evaluation activities became more formal and comprehensive in nature, and increasingly significant external support was required. These included two types of evaluation activity:

- Pilot exercises, with a focus on assessment of selected components of the program and limited involvement of actual users.
- Trial implementations, where users representative of the intended training participants were fully involved in the exercises, and all components of the TSP were evaluated. The trial implementation[8] provided the forum for obtaining comprehensive user input regarding user acceptability, tactical realism, training effectiveness, implementability, supportability, and perceived training benefit.

Throughout the evaluation exercises, instructional quality (i.e., conformance to established instructional systems development principles) received equal attention with tactical sufficiency and operational implementability. This helped to ensure that quality standards were maintained in parity across instructional effectiveness, tactical realism, and exportability aspects.

Evaluation Methodology

The methods employed to collect information changed between the early informal evaluation processes and the pilots and trials. During early stages of development, the activities were relatively unstructured. Developers focused their attention on specific processes that they needed to assess. For example, in early pilot tests of the scenario (described in Section 4), the scenario consisted of a loose representation of the probable maneuver scheme or task organization that would eventually be a part of the scenario storyline. The test was to determine if the simulation representation of the scenario would function as intended, providing cues and conditions as designed. Thus a scenario might be tested, revised, and tested again in the same day. Very little systematic data collection and analysis, in a traditional sense, was performed. Rather, the focus was on obtaining and applying information rapidly.

During the pilot and trial implementations, however, the data collection was more systematic and specific. Expected outcomes were targeted before each pilot or trial, in the form of specific questions, and evaluation instruments were designed to facilitate the collection of information to address the issues. The iterative nature of the pilot exercises yielded insight into how the training could be improved for further pilots, and eventually for trial implementation. Generally, pilot results included corrections, clarifications, resolution of inconsistencies, amplifications or elaborations, deletions, and development of new materials and procedures.

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[8] Both pilot tests and trial implementations were planned for the full BSE and all of the vignettes. However, difficulties in getting sufficient troop support within the project time frame allowed for a trial implementation of only one BSE mission and none of the vignettes.

The trial implementation was larger in scope than the pilots, and consequently involved more extensive formative evaluation procedures. The formative evaluation instruments for the trial were designed to support both observational and querying methods of data collection. The instruments included structured interview guides, evaluator guides, questionnaires, and group discussion guides.[9] Figure 6 describes the content and use of each of these types of data collection methods.

Method	Purpose and Content	Use
Structured Interviews	To determine how well the TSP facilitated preparation and role comprehension. Contained a core set of questions on how well the participants understood their roles and responsibilities prior to the exercise. Supplemental questions were also provided as probes.	Conducted in one-on-one or small group format prior to trial execution, but after participants had performed their preparation activities.
Evaluator Guides	Provided a set of questions to be answered that focused on specified issues. These guides aided evaluators in keeping their focus during the evaluation, and eliciting detailed feedback regarding how the TSP might be improved. Primarily direct observation instruments.	Used throughout the exercise process, including participants' preparation for the exercise.
Questionnaires	Biographical data and questions on training benefit, training design, the preparation process, and the TSP. Used to obtain opinions and reactions, and to elicit feedback of a general nature; were not designed to yield information detailing, specifically, how the training should be revised.	Administered upon completion of the trial.
Discussion Guides	Questions that focused on training design and value, as well as the TSP components and implementation processes. Used to obtain participant opinions and reactions about training effectiveness and other issues that surfaced during the exercise.	Used in discussions that occurred after the questionnaires had been completed.

Figure 6. Description of formative evaluation data collection instruments.

[9] Questionnaires were reviewed by ARI prior to the trial to ensure rights of the respondees would not be violated. The questionnaires were assigned ARI Personnel Test Number 59-86.

The Examine-Evaluate-Refine Feedback Loop

The primary goal of the evaluation activities was to influence constructively the development of training materials and procedures so as to enhance the quality of the program's training products. Thus the design of evaluation exercises and their interplay with program development efforts resulted in an iterative examine-evaluate-refine cycle. In this context, the feedback from each evaluation exercise formed the basis for the next phase of development. The feedback loop revealed the true value of the COBRAS program evaluation process.

Each evaluation exercise was designed for rapid documentation of results so that complete feedback could be disseminated quickly among the training developers. Indeed, involvement of the training developers in the observation process facilitated the extraction of findings and their translation into steps for modification. The observations and data from each exercise were organized and analyzed rapidly. The findings were then distributed immediately to the training developers and dialog sessions were organized, as necessary, to clarify and prioritize revision actions.

Summary

This section has described the project development timeline and the formative evaluation approach and methodology. The results of the evaluation activities, in terms of decisions, changes, and revisions, are integrated into the discussions of the development of the BSE and vignettes in Sections 4 through 9 of this report.

The following section (Section 4) describes the analysis and design phase of the project. In this phase, the training objectives, tactical scenario, and simulation usage were determined. These helped to define the architecture of the training program, which will also be described.

SECTION 4: TRAINING PROGRAM DESIGN

During the design phase, project staff continued to define the characteristics of the COBRAS program. This included designing the COBRAS scenario storyline, determining the training objectives and critical tasks associated with those objectives, selecting the most appropriate simulations, and planning the architecture of the training program's two primary components: the BSE and set of vignettes.

This presentation of design activities is presented in four parts:

- *Development of the Tactical Scenario*: The section begins with a discussion of the program's requirements for the tactical scenario. The discussion highlights the effect of the congruence requirement with the VTP in defining the scenario, and concludes with a presentation of the scenario specifications.

  The tactical scenario storyline was a necessary foundation piece for both the BSE and vignettes. Both sets of exercises were to derive their context and structure from the same scenario.

- *Identification of Training Objectives*: The analysis methodology that was developed to define training objective tasks is described. During the course of the analysis, the scenario was refined and completed. The resulting closed-loop developmental relationship between the training objectives and scenario ensures that the scenario fully supports performance of the training objective tasks.

  While the primary and immediate use of the task lists was in the BSE, the lists were also used in constructing the training objectives and tasks for the vignettes.

- *Simulation Selection*: This discussion presents a detailed explanation of the simulation selection process. The explanation discusses the most significant factors in the analysis and comparison of simulation capabilities. While there were other significant points of comparison, those discussed are the ones that served as selection criteria.

  From this overall analysis of simulation capabilities, decisions for simulation use for the BSE and for vignettes were made. The criterion factors were the same, but the decisions differed.

- *Training Program Architecture*: The section concludes by laying out the architecture of the BSE and the vignettes. The discussion on architecture provides an explanation of how developers initially intended that the training be conducted, and sets the stage for presenting the exercise development and evaluation activities that are contained in Sections 5 through 9 of this report.

Development of the Tactical Scenario[10]

The scenario guidance given in the SOW (U.S. ARI, 1994) served as a macro-level outline of the tactical context for scenario designers. That is, the designers were working within a prescribed structure of:

- three missions (MTC, AD, and DATK),
- all phases (planning, preparation and execution), and
- an emphasis on fire support, engineer, and air defense artillery (ADA) activities, and logistics.

Scenario Structural Decisions

During initial analyses of how the SOW (U.S. ARI, 1994) structural requirements would be expanded into a storyline, several additional decisions were made. These decisions were made in support of the overall training program objectives, by consideration of principles of structured training and attention to doctrinal guidance on brigade operations.

The first concerned the brigade's decision-making process. Both the deliberate decision-making process (DDMP) and a commander's modified decision-making process (MDMP) were being taught and encouraged in the U.S. Army's Command and General Staff College (CGSC), the Combined Arms Services Staff School, and at the NTC. Therefore, designers made a conscious decision to structure the scenario to include both deliberate decision-making and modified, time-constrained decision-making. The cues within the scenario would tell the brigade how much time was available for planning, which would in turn dictate the decision-making process to use.

The second decision that came out of analysis of brigade processes concerned the emphasis on CSS. Because of the specific instruction to include CSS, as well as planning, the scenario needed to incorporate a continuity between missions. This continuity would generate the time and conditions where CSS operations would be most influential. This same transition period between missions also created the window in the battlefield timeline when the brigade could be exercising its processes for current operations and simultaneous planning for the next mission. The primary cues for this brigade planning would come from the orders and instructions generated by a division headquarters.

Missions were therefore linked in a continuous and logical storyline. This mission flow had to be reflected in division missions which would contain and cue the brigade's missions. Similarly, the division mission had to be contained in plausible corps and joint TF campaigns. The times and linkages between missions, at all levels, also had to be coordinated. This higher consistency was essential because as brigade staffs develop their plans, those plans must support the division and corps commanders' missions and intents.

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[10] A "scenario" was operationally defined as a combination of starting conditions (unit locations and readiness levels, higher echelon orders) and predetermined activities (including commands from higher headquarters and controlled OPFOR activities). Thus the scenario included all of (and only) those conditions that were controlled by the training designer within the training support materials. Properly speaking, the scenario does not include the brigade's actions, performed in accordance with their own plan.

The third decision area also related to the requirement to stress the CSS functions and personnel. Scenario designers made the decision to induce predetermined supply and readiness conditions that would stress logistics and cause certain CSS activities to occur. The alternative was to rely on the scenario events or the simulation, either of which could produce a wide range of supply and readiness outcomes.

The fourth area in which preliminary decisions were made concerned the scenario development process. Because details of the training objectives and tasks had yet to be determined, it was decided that an initial rough scenario storyline would be used in the training objectives generation process (the Staff Performance Analysis [SPA], described below). As the tasks were defined, the scenario and tactical materials would be developed and refined in concert to ensure that the scenario and training objectives were compatible and mutually supporting.

Scenario Congruency Requirement

Another significant influence on the scenario shaping came from the requirement to remain congruent with the VTP scenario (as discussed earlier). The congruence requirement for the COBRAS and VTP scenarios meant that the two programs would attempt to use division orders, organization, equipment, terrain, mission timelines, enemy orders of battle, and intelligence information that were as similar as possible.

Different primary training goals and objectives between the two programs seemed at first to put congruence at risk. Those differences included:

- The VTP brigade training program was designed for ARNG enhanced brigades, while the COBRAS program was to be designed for AC brigades, leading to a conflict between two types of brigade organization.
- The VTP brigade training addressed a different set of primary training audience personnel than did COBRAS. The VTP sought to minimize CS and CSS functions, while the COBRAS project needed to emphasize those same CS and CSS functions.
- The VTP brigade project developed exercises that focused on mission execution only, whereas the COBRAS project focused on all mission phases, as well as the transition between missions.

However, despite early concerns that the two projects could not achieve both the congruence goal and their own overall training objectives, compromises were reached that resulted in essential congruence between the scenarios. In the final analysis, the requirement had a major effect on the COBRAS scenario in only two areas: the location and orientation of the brigade area of operations, and task organization and structure of the units represented in the scenario.

The first issue, concerning the brigade area of operations, was dealt with rather easily: The COBRAS brigade's missions were set on terrain that was used in the VTP's battalion-level missions (the NTC central corridor) in an east-to-west fight. It should be noted that this terrain congruence issue has now been addressed and resolved at levels from platoon through brigades. That is all of the VTP exercises and the COBRAS BSE scenario storyline are nested in the same corps and division campaign; the constant anchor (sometimes referred to as the "VTP stake

through the heart") for all levels is the location of one battalion TF at a particular location in the NTC central corridor.

In order to accommodate the differences in brigade task organization and structure, the COBRAS scenario designers created a storyline that provided justification for four maneuver battalions (two mechanized infantry and two armor) and a cavalry troop. Had it not been for the congruence requirement, the COBRAS brigade would probably have included only three maneuver battalions and no cavalry troop; this is a more typical organization for an AC brigade. Another effect of the unusual brigade structure was that the brigade's sector was larger than it would have been if there were no requirement for congruence. The larger sector was necessary to support the storyline for the four battalions.

Although, in description, these two sets of constraints seem to have only minor effects on the overall scope of the scenario, subsequent development was challenging and creative. Considerable ingenuity was required to create all of the justifications to make the brigade organization, division campaign, and use of terrain acceptable to training audiences. In fact, as will be discussed in Section 7, the 4-battalion structure has yet to be used in a trial implementation.

Scenario Development Activities

Scenario development for the two programs began as a joint effort. This was both possible, and necessary, because the VTP scenario was needed for VTP development well before the COBRAS scenario was required, and yet the VTP scenario storyline and other scenario decisions were still under development. Therefore, the two project teams worked collegially on the VTP tactical materials and other scenario development. This not only assisted VTP developers in achieving their goal of a tightly constructed scenario, but also gave COBRAS developers a chance to influence scenario development so that differences would be minimal. Additionally, the cooperative effort enabled the COBRAS team to gain a thorough understanding of the VTP scenario characteristics, so that additional development could be as easily accomplished as possible.

The COBRAS scenario design effort then branched off of the VTP scenario work. There was no overarching storyline in which the VTP missions were set; rather, each of these missions was built for an execute-only program, and they were designed to be executed in any order. As discussed above, continuity between missions was essential for the COBRAS scenario. Thus, the scenario was elaborated so that the three missions would be executable contiguously (i.e., MTC, followed by AD, followed by DATK) without disconnects in the storyline between missions; the underlying storyline was continuous, although the actual training would not necessarily run without pause from the first planning to the last execution phase.

The initial scenario rough outline consisted of the draft tactical situation and orders that had been prepared by VTP and COBRAS staffs for the VTP brigade exercises. Preparing more complete tactical products for the SPA (described below) consisted of revising the VTP Road to War and OPFOR plans; developing more complete COBRAS corps and division orders; and preparing other products that contained ancillary information (e.g., personnel status, levels of supply and maintenance, intelligence summary [INTSUM] reports, meteorological and terrain information) that would flow down from division and corps.

As the SPA was underway, scenario developers continued to refine the scenario storyline and generate the tactical materials. This included modifying the tactical products so that they would provide the necessary cues for the training audience, developing specifications of OPFOR activity that would drive staff actions, and determining the division and adjacent unit activities and communications that would both paint the appropriate tactical picture and stimulate brigade staff processes.

The SPA activities were supplemented by map exercises of the tactical events and verbal rehearsals of the communications aspects of the scenario storyline (e.g., scripted messages combined with radio communications from battalions). This testing was conducted to ensure that the scenario was tactically sound and that the actions that would be required of the division and brigade were consistent with current doctrine, as well as internally consistent. The most important focus, however, was on verifying that the scenario would cue the battle events that would drive the basic activities of the brigade staff, including CSS tasks.

The scenario was also evaluated by means of external reviews of the corps and division orders, conducted by CAC, Fort Leavenworth. In these reviews, the evaluation focus was not on whether the scenario would cue key events, but on the extent to which the tactical products conformed to current and emerging doctrine as defined by the subject matter expert (SME) personnel at CAC.

This initial review and testing process led to a number of revisions in the scenario. These included revisions in commander's intents, schemes of maneuver, graphics, tasks to subordinate units, and coordinating instructions. After extensive review, testing, and revision, the scenario was ready for further testing in a constructive simulation environment. Constructive simulation was chosen for testing because analyses (described later in this section) were already indicating that virtual simulation would not be suitable for an exercise scenario as extensive as that being developed.

To build the simulation data files, project simulation experts worked with project military SMEs to enter the scenario's details into the simulation (either Janus or BBS). These details included starting points, operational state (OPSTATE) data, supply levels, and movement plans. Upon the rare occasion that the simulation was unable to accept a scenario specification (e.g., a vehicle type was not available in the simulation) or a workaround, the scenario and tactical products were revised as needed to account for the deficiency. Once the simulation files were created, the scenario was ready for piloting in the simulation environment.

In the strict sense, pilots of the scenario in the simulation were conducted from June through November 1995, the same period of time as the task analysis phase (the SPA). These internal pilots were similar in focus to the map exercises conducted earlier; however, they also focused on the extent to which the simulation-driven scenario would generate critical events and cues within the simulated environment. As the piloting continued, both the storyline and tactical products were revised and the extremely specific details that had to be precisely defined were documented. Such details included supply levels, vehicle positioning, and unit movement rates. All these factors were designed to support scenario events that would cue brigade staff activities. In fact, the simulation-based evaluations of the scenario also served to support SPA activities and to validate and refine the SPA-developed task lists.

At the conclusion of this scenario design process, the COBRAS team had produced a scenario, described in Figure 7, and the tactical products that satisfied the needs for continuing development as well as the SOW (U.S. ARI, 1994) requirements. That is, the scenario supported CSS operations and provided viable performance opportunities for every member of the target training audience.

The Road to War

The scenario storyline begins with the brigade in an FTX, having been deployed to the country of Mojave because of an increasing threat from the Krasnovians. The FTX, which creates decrements in personnel and equipment status, ends as intelligence indicates that the Krasnovians are preparing to cross the international border.

The Movement to Contact (MTC)

While the brigade is in its assembly area (AA) conducting medical, repair, and replacement activities, it receives an order to conduct a MTC mission. Using the DDMP, the brigade staff prepares their order, while subordinate units continue their logistics efforts. The MTC is conducted against the Krasnovians' meeting battle.

After the brigade has met and defeated the Advance Guard Main Body (AGMB), circumstances require the brigade and the enemy to stop their advances and take up hasty defenses. The Krasnovian lead elements retreat to hasty defensive positions awaiting the arrival of second echelon forces to conduct an attack.

The Area Defense (AD)

The brigade staff then receives an order for an AD mission, and must simultaneously conduct its consolidation and reorganization activities and plan for the AD using an MDMP. The Krasnovians conduct their attack, which fails after inflicting some losses to the brigade. The brigade then conducts a rearward passage of lines to a rear AA (not performed in the exercise).

The Deliberate Attack (DATK)

Three days later (these three days are not represented in the exercise), the brigade receives a subsequent order to conduct a DATK mission against the remnants of the Krasnovians. The three days in the scenario provide a realistic time for the brigade to return its forces to a level of combat readiness which will make the DATK mission feasible. Again, the brigade staff uses the DDMP to develop its plan, briefs the plan, monitors preparation activities, and conducts the attack. The storyline ends with the defeat of the Krasnovians.

Figure 7. Description of the scenario underlying the Brigade Staff Exercise and vignettes.

The scenario described in Figure 7 forms the basis of the BSE. The higher echelon, adjacent and supporting units, subordinate units, and OPFOR all operate within rules based on the scenario. In this way, the training is structured to cue the performance of the selected training objectives.

This scenario also served as the foundation for developing the vignettes (described in Section 8). To derive vignette situations, events within the scenario were extracted from the general scenario background. In order to constrain the scenario segments to support only the

limited objectives and activities of a vignette, however, it was often necessary to modify the specific details of the event. For example, to focus participant attention on a mission transition process, it was not considered necessary (nor cost-effective, given the additional simulation control requirements) to have four battalions supplying cues. Therefore, for that vignette, only three battalions were written into the scenario.

In other cases, vignettes were developed around events that were known to be unlikely in the overall scenario, but that were significant and important conditions for the staff to practice. For example, a refuel on the move (ROM) was not a probable brigade activity, given the total scenario storyline, but was judged by developers to be an activity on which the brigade staff should train. Therefore, a segment of the scenario was lifted out of context, revised to justify the ROM, and used as the basis for a vignette.

Identification of Training Objectives

Under normal circumstances, training objectives are determined, at least to some extent, in an analysis conducted at the same time as and interactively with scenario development. The process often depends on the use of a domain of defined tasks from U.S. Army doctrinal publications. The scenario is designed to cue the performance of critical tasks from the list, and tasks are selected that contribute to performance in the scenario. It is a completely interactive process, but does presume the prior existence of the domain list of tasks from which to select.

In the COBRAS project, however, the initial analysis confirmed the statement (1994) by MG Maggart (then Assistant Commandant of the USAARMS) that there are significant gaps in the task lists contained in doctrinal publications. He referred to these undocumented tasks as "living tasks," indicating that they are both necessary and frequently performed, but are not captured in doctrine. As a result, the project was being asked to design training for staff processes that were not yet documented, in addition to those found in traditional sources. Project staff and ARI agreed to expand the task identification process from a focus only on documented tasks to include identification of undocumented tasks supporting performance in the scenario.

Documented Tasks

The starting point for defining the performance requirements of the selected brigade staff officers was with material that had already been developed. This included both doctrinal material contained in official Army publications and emerging developmental efforts and databases which, while not necessarily designed to drive doctrine, did appear valuable as TTP that elaborate doctrine. The COBRAS team identified four potential sources of task documentation, including:

- standard doctrinal sources,
- Battlefield Function (BF)[11] documentation (Mullen, 1994),
- the Commander's Assessment Database (Wilkinson, 1994a), and
- the Automated Systems Approach to Training (ASAT) (U.S. Army Training Support Center [USATSC], 1997).

[11] The BFs were originally known as Critical Combat Functions (CCFs).

This was then supplemented with an analysis leading to the identification of previously undocumented tasks.

Standard doctrinal sources

The standard doctrinal sources used to define the basic domain of performance requirements was represented by existing U.S. Army publications such as Army Training and Evaluation Program (ARTEP) - Mission Training Plan (MTP), Field Manual (FM), and Student Text (ST) materials. Prime among these in defining brigade-level staff operations were:

- *Mission Training Plan for the Heavy Brigade Command Group and Staff*, ARTEP 71-3-MTP (DA, 1988);
- *Tactics and Techniques for Combined Arms Heavy Forces: Armored Brigade, Battalion/Task Force, and Company/Team*, FM 71-123 (DA, 1992);
- *The Armored and Mechanized Infantry Brigade*, FM 71-3 (DA, 1995);
- *Staff Organization and Operations*, FM 101-5 (DA, 1984);
- *Intelligence Preparation of the Battlefield*, FM 34-130 (DA, 1989); and
- other basic publications addressed to specific staff or special staff positions.

Much of the doctrine that defined staff functioning (as detailed in FM 101-5, [DA, 1984]), however, was currently undergoing an extended revision and production process and was not available as a final document. Therefore, another source of interim doctrinal material in this area became the text material used by CGSC, most notably *The Command Estimate Process*, ST 100-9 (CGSC, 1993) and the *Command and Staff Decision Process*, ST 101-5 (CGSC, 1994), the latter of which is made up of draft extracts from the proposed FM 101-5 (DA, in preparation) and FM 34-130 (DA, 1989).

As essential as such documentation is, it is in many ways insufficient. The foundation brigade ARTEP (DA, 1988) was published nine years ago and is based on development that predates its publication. Furthermore, such documents are not intended to be primary instructional manuals, and therefore lack instructionally useful specification. For example, FM 71-3 (DA, 1995) specifies that staff officers are assigned functional areas of interest and responsibility to provide information, make estimates, make recommendations, prepare plans and orders, and supervise the execution of decisions. The assignment of responsibilities, however, does not specify how staff members must perform, individually and collectively, in meeting these responsibilities.

Many other publications lack specificity in addressing the brigade in multiple echelons and missions. Established doctrine, in the form of Army publications and curriculum materials from staff officer preparatory courses, provide a solid groundwork. However, project staff validated MG Maggart's assertion that there was a need to go beyond these sources in identifying and specifying the brigade staff tasks and activities. In particular, the doctrinal publications have gaps in such areas as specifying the interactions and synchronization necessary for effective functioning, which are essential in structured training situations.

Battlefield Functions

Examination of published information then moved to less traditional sources, including the BFs. The BFs are defined as ". . . the integration of related participants, tasks, and processes into a source of combat power" (Mullen, 1994, p. 1), and were being analyzed in ARI-sponsored research at the Unit Performance Research Unit in Monterey, California. The documentation of BFs describes battlefield performance in every battlefield operating system (BOS), and is organized according to the functions without reference to missions. The BF analyses are primarily ARTEP-based, with some supplemental material obtained from FM sources and with some renaming and rewording of task statements. During the COBRAS design timeframe, 39 BFs had been identified; 26 were appropriate at brigade level, and analyses for 11 of these BFs were being constructed.

Two points need to be made about the applicability of the BF analysis work to the COBRAS project. First, ". . . the technical approach to [BF] task analysis is based on research of Army doctrine" (Mullen, 1994, p. 3). The ARTEP-MTPs are the primary source of information and when "it appears logical to have a task but there was none identified in a MTP, tasks were extrapolated from the relevant [field] manuals" (Mullen, 1994, p. 3). In other words, there is no intent in BF development to go beyond tasks documented in ARTEP-MTPs or FMs.

Second, the brigade BF work was an ongoing effort and the work paralleled the COBRAS effort. Although Mullen (1994) had identified the 26 BFs relevant to brigade operations, the analyses for the brigade BFs were not completed in time to be used in the COBRAS development work.

Nonetheless, it was essential that the two projects continue to exchange information. Both efforts were looking at the same level of operations, but with different methods and goals. The BF development addressed task and function descriptions that would be applicable to all brigade missions. As described below, however, the COBRAS project analyzed events to identify subtasks and tasks for specified missions and conditions. In the end, the results of the two efforts were mutually supporting and convergent. The two projects continued to share concepts and ideas even past the duration of the COBRAS project.

Commander's Assessment Database

A second nontraditional source examined was the Commander's Assessment Database, an R&D effort carried out by the 194th SAB at Fort Knox, Kentucky. The development of the database was envisioned as a proof-of-concept for identifying unit tasks that could be trained in a multitude of diverse simulation environments (Wilkinson, 1994b). Brigade-level and subordinate unit mission-essential task list (METL) information was collected from units within the 194th SAB. In all, over 1300 tasks were identified from squad to brigade-level (Wilkinson, 1994a). Subsequently, a small group of SMEs from the 194th subjectively assessed the battle tasks that support these METLs to determine whether any of 19 different TADSS could support training of the aforementioned tasks.

The battle tasks collected from the 194th SAB were not originally associated with standard ARTEP-MTP tasks. In a subsequent phase of the effort, string searches and content searches were used to match the battle task titles generated and named by the 194th SAB respondents with ARTEP task titles. Because complete matching was possible, it was concluded

that the tasks identified by the Commander's Assessment did not add any new or undocumented task information that could be incorporated into the materials being developed for the COBRAS training program.

Automated Systems Approach to Training

The final existing source that was examined was the ASAT, a computer software tool developed by the USATSC at Fort Eustis, Virginia, to provide on-line training information management capabilities to Army training developers. Because paper-based ARTEP-MTP manuals can take up to 36 months to publish (R. Armstrong, personal communication, April 24, 1995), the doctrine can become outdated before a new manual is published and available. One advantage of the ASAT system is that it provides access to the database containing the most recent additions and modifications made to existing doctrine by the proponent schools.

For the COBRAS project, which at the time was still investigating all existing task documentation, ASAT was seen as a potentially useful source of up-to-date tasks, conditions, and standards. For example, there are 39 additional brigade-level tasks listed in the ASAT version of ARTEP 71-3-MTP, compared to the most recent approved version (DA, 1988). Development of ASAT was an ongoing effort, as was the proponent input to the database. The COBRAS team continued to monitor updates to the ASAT database throughout the project's duration. However, the brigade-level tasks contained in ASAT were no more complete in specifying staff performance requirements than were previously existing ARTEP tasks. Thus, no significant contributions to the COBRAS task lists resulted from this effort.

Undocumented Tasks

The research need for additional identification of tasks, initiated with MG Maggart's comments, prompted operationalization and expansion of Maggart's identification to include innovative and adaptive behaviors that embody successful and desirable performance. The cumulative domain of these behaviors has been termed, "undocumented tasks," to differentiate them from the mainstream, primarily ARTEP-based, documented tasks.

Definition of the domain of undocumented tasks began with a literature search, which revealed the extent to which other disciplines were facing the same dilemma that Maggart expressed. Organizational theorists (e.g., Katz & Kahn, 1978) have long recognized that formal role prescriptions (i.e., task lists) tend to be incomplete and that additional actions are required for organizational success. While some of these actions may be very situation specific, other actions may well have general applicability or signal individual or team processes that need analysis. They are presumed to exist, but they have not been systematically identified or structured into any kind of coherent organization. Maggart's "living tasks" would appear to fall into this category.

Olmstead (1992) advocated that the Army augment its training of battle staffs with a process approach built on "organizational competencies" and concluded that staff personnel must be competent in adapting to changing environmental circumstances. The essence of this need is that personnel must continually monitor the situation around them (maintain situational awareness) so that they can *apply known responses* to anticipated changes and *develop novel responses* to unexpected developments. By their nature, novel responses to novel situations normally cannot be captured and added to a task in advance of their occurrence.

However, structured training, based in simulation, enables the controlled presentation of cues, allowing deliberate manipulation of the situation to effect a desired outcome. Furthermore, monitoring and problem-solving skills can be modeled and structured programs developed to reinforce the need for flexibility. Olmstead's (1992) arguments further suggest that there are systematic procedures for being creative and application of these procedures increase the chances for mission success. The importance of adaptive and innovative tasks for the COBRAS project was to identify when to apply proven processes and when to create them.

Living, innovative, and adaptive tasks are closely related and overlapping concepts. It is not important to distinguish among the three concepts. It is important, however, to recognize the need to expand the domain of tasks beyond the traditional and existing documented task lists. As Maggart (1994) notes, this will not be done quickly or in its entirety in the near time frame. The COBRAS project, however, recognized that there was an immediate need to expand the knowledge base in this area, before continuing with the training program development.

The Staff Performance Analysis Process and Results

In response to the need, the project staff developed a process for discovering these types of tasks.[12] The methodology and the criteria for selection, which hold great promise for the continued analysis and documentation of staff activities at all echelons, are described briefly below, and the process is diagrammed in Figure 8.

In the SPA, project staff research scientists and SMEs on planning and executing brigade operations worked together to explore systematically the performance of brigade staff activities required in the conduct of the three selected missions. Activity exploration was conducted through mission enactment, or roleplay events, and introspective probing after mission enactment. Thus, both immediate and briefly delayed recollections of physical and cognitive processes served as the foundation of task identification.

The identification of staff products, as well as staff processes, was critical to understanding and documenting the staff processes and their outcomes. Products identified during the SPA included the basic, standard tactical products (e.g., warning order [WARNO]), as well as partial or interim products that represented the documentation of information (e.g., restated mission statement) contributing to the construction of the standard products. The SMEs not only identified the staff products, but preserved the products that were generated during the SPA. Some of these eventually were used in refining the scenario storyline and preparing the AAR structure and materials (described in Section 6).

[12] A complete description of the conceptual foundation for the SPA methodology, the steps in the methodology, and the tasks resulting from the methodology are provided in a separate report (Ford & Campbell, in preparation).

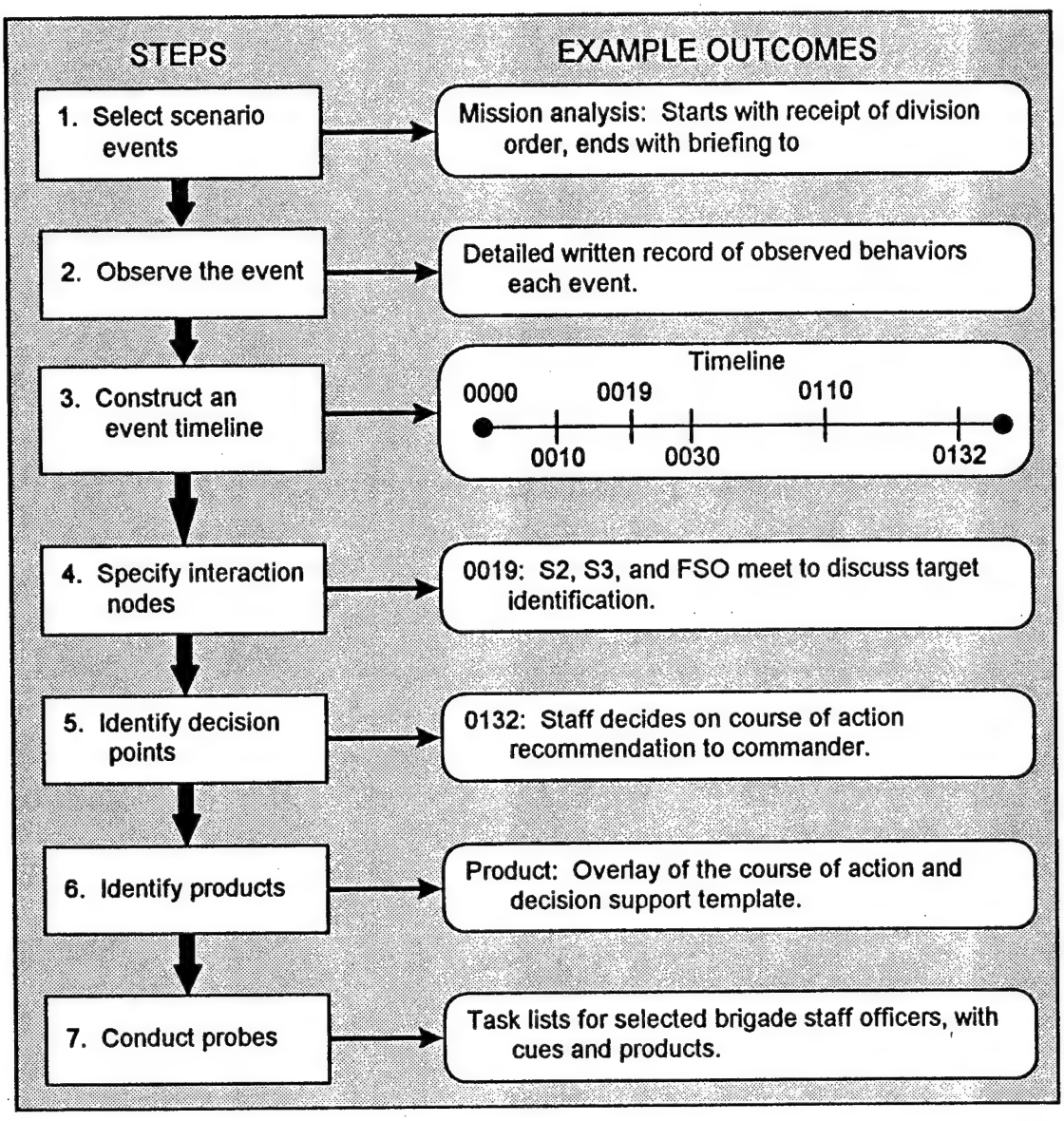

Figure 8. Diagram of the Staff Performance Analysis procedure with example outcomes.

The goal of the SPA, with respect to the training objectives, was to identify and specify tasks that met certain criteria based on the project objectives. Those criteria included the following:

1. Tasks selected for the exercise should focus on the specific missions, enemy, terrain, troops, and time available (METT-T) in the COBRAS scenario.
2. Tasks should represent the activities of the target training audience members.
3. Tasks should address all mission phases: planning, preparation, and execution (including consolidation and reorganization).
4. Tasks should emphasize collective as well as individual activities. That is, they should focus on both individual staff officer actions and interactions among staff members.

5. Tasks should have either observable activities or observable outcomes, and should be non-trivial. Distinct physical behaviors satisfied these criteria, as did cognitive processes (e.g., reasoning and the use of knowledge) that cannot be observed, but that are perceptible through the examination of material outcomes.

In the end, the SPA yielded task lists that portray each staff member's involvement and actions for each mission segment. The SPA also allowed analysts to pinpoint the actions and events that should cue training participants to perform the required tasks, and observers to watch for evidence of performance. The task statements, products, and cues identified in the COBRAS brigade staff task lists are measurement points that should facilitate the provision of feedback to the COBRAS training audience. The task lists are contained in the BSE materials for two purposes:

- to assist observers in observation and feedback, and
- to preview performance expectations for the training audience.

The COBRAS task lists were generated because existing documentation did not support the performance observation system. However, the information in the various sources is not inconsistent or contradictory. Rather, it serves the different purposes for which it was recorded.

For the vignettes, the analysis and the task lists served as the basis for the objectives and AAR guidance. Because of the vignette focus on small groups and the short duration of vignettes (usually less than a half day), observation, feedback, and AARs were all rolled into a single fluid process. Vignette developers used the basic individual task lists to derive corresponding small group performance lists addressing the event and activities of the vignette. These process lists were further expanded into a series of probing AAR questions that the vignette training leader uses to stimulate discussion of the exercise. More detail is provided in Section 8.

Simulation Selection

From the project objectives (described earlier) and through consultation with ARI, the COBRAS team began their initial simulation analyses with the following expectations. The analysis would assess the appropriateness of developing the BSE on both virtual (SIMNET) and constructive (BBS or Janus) simulation. For the vignette exercises, use of BBS and/or Janus would be examined.

The process of simulation assessment and selection began early in the project and lasted well into the scenario design process. The process started with analyses of the simulations to identify and compare the capabilities of each simulation to support brigade-level staff exercises that focused on CS and CSS operations. While there were numerous considerations in analyzing the simulations, the criteria that were most pertinent to the selection of simulations included the following:

- Functional representation: The simulation(s) chosen had to facilitate operations within all brigade functions, especially the selected CS and CSS operations.
- The size of the terrain database: The terrain database(s) of the simulation(s) chosen had to be large enough to allow for brigade-level operations.

- The ability to generate combat report information: Printed reports were estimated to be important to providing thorough, accurate, and timely combat reports to the brigade staff.
- Operator requirements: The COBRAS project sought to maximize training value while minimizing personnel support requirements.
- Brigade asset representation: The simulation(s) had to represent brigade assets at a level that would stimulate the reporting of detailed combat and status information, in order to drive CS and CSS operations.

The COBRAS simulation experts examined the documentation of the simulations and ran tests of simulation capabilities to verify the extent to which the simulations met the criteria identified above. The findings of these analyses are summarized in Figure 9.

Criterion Factor	BBS	Janus(A)	SIMNET/ModSAF
Functional representation	Intelligence: Excellent Maneuver: Good Fire support: Excellent Air defense: Good Mobility/survivability: Good Logistics: Excellent	Intelligence: Good Maneuver: Excellent Fire support: Excellent Air defense: Good Mobility/survivability: Good Logistics: Poor	Intelligence: Excellent Maneuver: Good Fire support: Excellent Air defense: Fair Mobility/survivability: Fair Logistics: Fair
Terrain database size	NTC 180 x 180 (Excellent)	NTC 150 x 150 (Good)	NTC 150 x 150 (Good)
Message generation	Printout capability (Excellent)	No printout (Poor)	No printout (Poor)
Operator requirements	Recommended: 28 Adequate: 18 Minimum: 9 [10/10/9 workstations] Overall: Poor	Recommended: 15 Adequate: 9 Minimum: 5 [15/9/5 workstations] Overall: Good	Recommended: 12 Adequate: 12 Minimum: 12 [12 workstations] Overall: Good
Asset representation	750 icon (total) limit (Excellent)	1200 icons (total) limit (Excellent)	

Figure 9. Simulation criterion factors and summary of capabilities for Brigade/Battalion Battle Simulation, Janus, and Simulation Networking/Modular Semi-Automated Forces.

The basic capabilities analysis was followed by hands-on testing of the scenario in simulation. In the SPA, the first mission to reach the execution phase was enacted using Janus to drive the brigade staff enactment. It soon became apparent that, using Janus, the desired CSS emphasis could be realized only with extensive scripting of casualties, damage reports, and repair reports. This information is not generated by the simulation, which instead produces a limited number of outcomes. For example, a direct hit on a tank may be registered as a firepower, mobility, or catastrophic hit; casualties are all or none killed; and repair activities are not

represented. Later SPA events were played out in BBS. There it was demonstrated that BBS information and reporting capabilities, especially regarding personnel and logistics data, were much better able to drive the CSS activities than were Janus features.

It was apparent early that a brigade staff training exercise in SIMNET/ModSAF would strain the simulation's resources, without providing significant training value. Virtual simulation is best suited to situations where the training audience must be on the ground, viewing the terrain, preparations, and battle at eye level. While it would have been advantageous to allow the brigade staff to do a terrain reconnaissance in virtual simulation during their mission planning, the simulation would not have supported the remaining parts of the scenario (preparation and execution). Additionally, few of the brigade's assets (supporting and subordinate units) could be represented in the virtual simulation itself, because of the relatively small number of SIMNET combat vehicle simulations and their configurations (M1A1 tanks and Bradley infantry fighting vehicles). Rather, most of the representation of brigade assets would be done in ModSAF with semi-automated forces. And as a constructive simulation without SIMNET, ModSAF is less suitable for brigade functions than is BBS.

After contrasting the capabilities of each of the simulations to meet the project's needs and testing the scenario in BBS and Janus, the COBRAS team came to the following conclusions. For the BSE, SIMNET/ModSAF was not a feasible choice given the scope of the exercise, as described above. Furthermore, because the pilot execution on Janus exposed its limited CSS capabilities, Janus was an unlikely medium. Because of its extensive capability to replicate CSS operations, BBS (version 4.0) became the clear choice.

These same factors affected the selection of simulations for the vignettes. In this case, however, the requirement for the simulations to minimize support requirements was seen as being of primary importance. Vignettes were to be short exercises focusing on small groups of staff members working on specific activities. Because most of the variance in staff activity is represented during the plan and prepare phases of mission conduct, planning and preparation became the focus of the majority of the vignettes. For vignettes occurring within the bounds of these phases, simulation-generated input to the brigade staff is limited and the staff is not making decisions that need to be executed in the simulation. As a result, neither BBS nor Janus was judged to be appropriate for vignettes focusing on planning and preparation. Rather, "live simulation" became the simulation mode of choice for these vignettes. In the live-simulation vignettes, staff members receive background tactical information (print-based or oral) and act out a situation from the cues provided in the background information.

Training Program Architecture

The processes of designing the scenario storyline, identifying training objectives and tasks, and selecting the appropriate simulation (as described above), represented the first three steps in designing the COBRAS training program. The final step was to design the overall architecture of the program for the two types of exercises. This section describes the planned architecture of the COBRAS training program, first for the BSE, and then for the vignettes. For both types of exercise, the discussion describes training objectives and emphases, exercise organization, and training audience. Other design decisions made during development affected supporting participants and the final structure of the TSPs, and will be described in Sections 6 and 8.

Planned Architecture of the Brigade Staff Exercise

The BSE was to be a structured, simulation-based training program. The focus of the structure would be on interactions among the brigade commander and his staff as they conduct planning and employ brigade assets. All of the program development decisions were made to optimize the opportunity for the brigade staff to practice planning for combat operations, employing its assets, and arranging for combat functions. The program, as designed, was to give the commander and his staff a chance to practice the tasks they should perform as they fight the brigade in particular battles. Within a simulated combat situation, they would determine what had to be done on the battlefield, who would do it, and how their actions are linked to actions of other units and BOS.

Primary Training Audience

The primary training audience for the BSE was to include the brigade commander, the brigade primary staff (XO, S1, S2, S3, S4, and the FSO), and the special staff who serve as links between the brigade and four of its systems (fire support, air defense, engineer, and logistics). These linking personnel were determined to be the following:

- the air defense coordinator (ADCOORD, the ADA battery commander),
- the engineer (the engineer battalion commander),
- the forward support battalion (FSB) commander, and
- the fire support coordinator (FSCOORD, the direct support (DS) artillery battalion commander).

In addition to his role within the exercise as the brigade's leader, the brigade commander would be a major decision-maker in the conduct of the exercise. The brigade commander would retain responsibility for the preparation and readiness of the brigade staff for the exercise, functioning of his staff, and maintenance of staff work areas. It would be his responsibility to keep the brigade troop-leading process on schedule to meet the exercise milestones, such as line of departure (LD) times, orders briefing times, and time for AARs.

Other Participants

Based on earlier simulation-based training projects, developers were aware that conduct of the BSE would require the participation of personnel in addition to the primary training audience. There are five other types of participants, as shown in Figure 10. While they are not considered to be the target recipients of the training, the value of the exercise to their skill development is intuitively obvious. (Questionnaire data obtained during the trial implementation support this claim; see Section 7.)

Role	Responsibility
Observers	During the BSE, the observers would provide performance feedback to the primary training audience. Feedback would be provided in individual and group AARs, and coaching would also be encouraged, as appropriate.
Roleplayers	Subordinate and Supporting Units: The major elements of the brigade would be portrayed by personnel of subordinate and supporting units, performing the duties of the functions and units they are normally assigned. Exercise Control (EXCON): The role of the division staff was to be played by personnel at an EXCON workstation. These roleplayers would dispense scripted and hard copy messages intended to maintain the integrity and flow of the scenario to support the training objectives. In doing so, the EXCON roleplayers would cause the occurrence of significant events that would cue staff actions. In addition, the EXCON roleplayers would respond to questions and requests from the brigade staff using prepared guidelines. This operational relationship would represent the mechanism by which the unit's execution of the exercise would be controlled. OPFOR: The OPFOR roleplayers would direct the actions of the OPFOR following the training's guidelines and the situation-specific instructions. The purpose would be to provide the cues to stimulate performance of the training objectives by the brigade staff. Roleplayers would not directly control the simulation, but work with BBS interactors (described below) to extract the operations, intelligence, and logistics information they need from the simulation, and carry out commands to the BBS-simulated unit.
BBS Interactors	Each workstation would be staffed with interactors who would operate the computer terminals that control BBS. Their function would be to translate the tactically-oriented instructions provided by roleplayers into BBS computer commands, using computer generated map snapshots of unit movements. Interactors would also construct and print out a variety of tactical, logistical, and status reports of the units.
Exercise Management	The exercise would also require the involvement of several senior military personnel to attend to administrative aspects and tactical guidance within the exercise.

Figure 10. Roles and responsibilities of the Brigade Staff Exercise's "other" participants.

Training Emphases

The BSE would place special emphasis on CSS, planning, and the decision-making process. The simulation would be used to generate the information, cues, and simulated operations which would allow CSS to be a major consideration, and the exercise would require logistics activity during all phases. To facilitate a focus on planning, each mission in the exercise would begin with receipt of a division order and the planning requirement, concurrent with the requirement to track brigade readiness levels.

The BSE storyline would require both the DDMP and the MDMP at different points. For the MTC and the DATK, the scenario would provide the needed time for the brigade staff to use the DDMP to develop its plan. Limited time would be available in the AD mission, causing the brigade to use the more accelerated MDMP.

BSE Mission Selection Options

With the three missions, six implementation options were to be designed, as shown in Figure 11.

Option	Description
1: MTC → AD → DATK	Would permit the brigade's planning process to begin before hostilities and continue throughout the three missions, and require the brigade to use both the DDMP and the MDMP. This option would provide the most robust opportunity to practice CSS tasks. The CSS activity would influence the operation from the time the brigade begins its transition from the FTX to combat, and continue through the completion of the DATK.
2: MTC → AD	Would start with the MTC, transition to the AD, and end when the brigade completes its defenses, consolidates its forces, and knows the status of its units. Both the DDMP and the MDMP would be practiced, and CSS activities would be ongoing. The brigade's posture at the beginning of the AD would depend on its losses in the MTC and on the resupply and replenishment that take place during the transition.
3: MTC	Would provide a logical entry into the exercise, with brigade units performing reorganization activities and reporting their status as the staff plans the mission using the DDMP. The exercise would end when the enemy AGMB breaks contact and assumes a temporary defense.
4: AD → DATK	The AD would start with the brigade still in limited contact with the enemy following the MTC. The brigade's readiness posture would represent what a brigade could expect following a MTC. This condition would require the brigade to rapidly assess its combat capability and conduct the resupply, replenishment, and other CSS activities to prepare for the AD mission. The time available would demand that the brigade use the MDMP to plan the AD. This option would be useful when the brigade does not wish to train on the MTC. It is a difficult starting point, however. The participants must be fully read into the scenario and be ready to take control at a point when the brigade is very active.
5: AD	The initial conditions would be the same as for option 4, with the brigade just completing the MTC. As with option 4, the entry point for this option would offer a considerable challenge to the brigade staff. The MDMP must be used to plan the AD. The mission would continue, terminating as the brigade consolidates its forces as in option 2.
6: DATK	The brigade would have (notionally) completed the MTC and AD missions and would be located in an AA. Its readiness posture would be representative of a unit that has fought the previous two missions. The CSS activities would be ongoing as the brigade continues planning (using the DDMP) and preparations for the attack and replenishes and improves its combat readiness. The exercise would terminate as the brigade seizes its objective and consolidates, before replenishment and repair which would precede the next mission.

Figure 11. The six implementation options for the Brigade Staff Exercise.

Preparation for the Exercise

The BSE itself was seen as an 8- to 10-hour-a-day training program. Performance of all three missions in a continuous sequence would require 14 days; each mission alone would require 4 or 5 days. The preparation time for the brigade staff was intended to be limited to skill preparation, as opposed to making training arrangements. Their preparation would be focused on becoming familiar with the tactical situation by studying the TSP preparation materials, and studying doctrinal and TSP lists of performance requirements.

BSE TSP Structure

Early specifications (the project research plan [HumRRO et al., 1995a] and design report [HumRRO et al., 1995b]) anticipated that the TSP would include four types of materials:

- tactical materials,
- unit preparation materials,
- trainer materials, and
- simulation system materials

This four-part conceptualization was based on work performed for the VTP. However, as the TSP was taking shape, a revised structure was designed to describe more precisely the contents of the required TSP. This revised five-part structure was consistent with the emerging guidance in TRADOC PAM 350-70 (DA, 1996). The TSP contents, using the five-part TRADOC structure, are conceptualized as follows:

- Exercise management/administration materials—resource specifications, mission selection options, scheduling guidance, and EXCON guidance.
- Tactical materials—orders and overlays, INTSUMs, and prepared messages.
- Training audience preparation materials—training objectives and background tactical scenario descriptions.
- Training support personnel materials—tactical situation background, report forms, and other guidance for roleplayers, observers, and interactors.
- Simulation control materials—tapes and documentation of scenario conditions, including environment, unit status, systems and equipment types, personnel/ equipment/supply levels, and operator instructions.

Architecture of the Vignettes

The COBRAS vignettes were to be short, structured, self-contained training activities that would each focus on a specific staff process event and on specific members and groupings of the brigade staff. Each vignette's activities would be a "snapshot" of a segment of the entire staff process. They were to represent extracts of activities that are normally performed by the staff in a context-rich situation. That is, the vignettes would lift discrete events out of the context in which they are normally found and, for training purposes, treat them in isolation.

Providing practice opportunities was to be the key to the vignettes' value to a brigade. Each vignette had to set up an environment in which selected members of the brigade staff could

focus on the performance of the activities required by individual segments of the plan, prepare, and execute processes. Vignettes were seen as potentially well suited for the intangible aspects of staff processes, including integration, coordination, synchronization, and the establishment of roles and associations.

The vignettes were to be derived from the scenario storyline that underlies the BSE. The vignette scenarios could differ from the scenario of the BSE, however, in that each vignette's scenario could be modified, as necessary, to support the specific training objective of the vignette. That is, each vignette scenario would set up the tactical situation that would require only the participation of a selected group of the brigade staff members. Scripted messages and pre-developed products from notional staff members would fill in for staff personnel that would not be part of the vignette primary audience.

After development and analysis of the COBRAS scenario, the project team defined 13 scenario events around which vignettes would be constructed (the process for selection of the events is provided in Section 8). Figure 12 lists the event and training audience for each vignette.

	Vignette Events	Target Training Audience
1	Plan for Dislocated Civilians	S1, S2, S4
2	Plan Refuel on the Move	S4, FSB Cdr
3	Develop Concept of Service Support	S1, S4
4	Develop Reconnaissance and Surveillance Plan	S2, S3
5	Conduct Target Development	XO, S2, S3, FSO
6	Develop Air Defense Concept	S2, S3, ADCOORD
7	Develop Contingency Plan	S2, S3, Engineer, FSO
8	Conduct Mission Analysis	XO, S1, S2, S3, S4, Engineer, FSO, ADCOORD
9	Develop Courses of Action	XO, S1, S2, S3, S4, Engineer, FSO, ADCOORD
10	Conduct Course of Action Analysis	XO, S1, S2, S3, S4, Engineer, FSO, ADCOORD
11	Conduct Special Staff Rehearsal	XO, S2, S3, Engineer, FSO, ADCOORD
12	Coordinate Mission Operations (Janus-supported)	XO, S2, S3, Engineer, FSO, ADCOORD
13	Coordinate Mission Transition--Offense to Defense (BBS-supported)	XO, S1, S2, S3, S4, FSB Cdr, Engineer, FSO, ADCOORD

Figure 12. Vignette titles and primary participants.

Eleven of the 13 events highlight selected aspects of the staff planning process. These 11 events (the first 11 in Figure 12) are based on the requirements outlined in the DDMP as described in FM 101-5 (DA, in preparation). They were to be developed for performance in a live training environment (i.e., no electronic simulations).

The other two vignettes would also require staff planning, but in a more complex situation--overlapping with the execution phase of a mission. Because these vignettes focus in part on mission execution, they would be supported by constructive simulation, which can provide

the continuous string of cues regarding actions on the battlefield needed by the staff to perform their activities. The time requirement for these vignettes would be substantially greater than for the previous 11 vignettes, although each could still be executed in a single day. The extra time would come into play during vignette preparation. Preparation activities for these vignettes, from the time the training audience receives their tactical situation information to the beginning of execution could require up to one day. This day could also be used to train simulation operators that are required by virtue of the fact that the vignettes are executed in Janus and BBS.

While there is a performance logic to the vignettes, a sequence was not part of the design. The content reflects planning requirements and the steps in the tactical decision making process, followed by execution activities, and by consolidation and reorganization. This is the sequence in which they are listed in Figure 12. But the vignettes would not build on each other or rely on input from preceding vignettes. Each vignette was to be constructed to be conducted independently from other vignettes.

The vignettes were to be designed to be conducted by brigade personnel and within brigade resources. A designated Training Coordinator would be responsible for preparing and conducting the vignette. Of course, the two vignettes that require simulation would require support of a simulation center, but all training and administration activities were to be performed from within the brigade resources.

Summary

This section has described the initial analysis and design phase of the project. During this design phase, activities included development of the scenario storyline and the training objectives, and selection of simulation to support the training. In order to provide an overall context for the development descriptions in the next four sections, this section also included presentations of the planned architecture of the BSE and the vignettes.

Sections 5 through 7 will focus on the process for developing and evaluating the BSE and the associated TSP. Sections 8 and 9 will do the same for the vignettes.

SECTION 5: PILOT TEST OF THE BRIGADE STAFF EXERCISE TRAINING SUPPORT PACKAGE

The design and development of the BSE had begun with an examination of the design characteristics specified in ARI's SOW (1994). The design characteristics were further refined in the analysis and design phase (as described in Section 4). The key elements produced during the design phase for the BSE included the multi-mission scenario, a listing of tasks and training objectives, the selection of a simulation approach, and an outline of the BSE architecture.

With the design characteristics specified and the scenario and task lists developed, the project moved into TSP construction. The initial TSP was based on experience gained in the SPA activities and prior development experience on the VTP. By late November 1995, much of the TSP existed in draft form; other components were represented by placeholders that would be drafted during and after the external pilot test.

As discussed in Section 3, formative evaluation activities (including internal reviews and checks as well as the pilot and trial implementation) were conducted throughout the entire process. The purpose of the formative evaluation was to provide feedback to facilitate the improvement of the training. Thus, as each aspect of the program was designed and developed, evaluation activities were conducted to identify gaps and errors in content, and inefficiencies in procedure.

This section describes the pilot test plan and the associated formative evaluation objectives. It also documents constraints that limited the scope of the evaluation. The evaluation findings and the revisions made to the TSP as a result are then presented. The evaluation findings represent both feedback provided by participating units and observations made by COBRAS staff members, and provide a comprehensive summary portrayal of the data collected.

Brigade Staff Exercise Pilot Test Plan

The project staff was prepared to conduct a pilot test of the scenario and selected TSP components in December 1995. The pilot test was to cover all three missions and use actual brigade personnel in the key positions. It would be partially staffed by COBRAS developers, and on the basis of their experience, other TSP components would be developed.

However, ARI's requests for troop support could not be filled; no brigades were able to participate in a pilot implementation. Instead, the plan was revised to include an external pilot of the MTC-AD missions in BBS, using battalion-level personnel in the training audience roles.

This pilot test was the first look at the program in the context of an external execution, combining all existing elements of the TSP and most of the participants. COBRAS staff were, for the most part, data collectors rather than active participants.

Pilot Test Objectives

The objectives of the pilot were as follows:

- to define training management procedures,
- to conceptualize the performance observation and feedback system,
- to analyze the pre-exercise BBS training need for interactors and roleplayers,
- to obtain user reactions to the existing TSP components,
- to evaluate the scenario tactical materials,
- to examine staffing specifications and participant workload requirements,
- to evaluate the amount and realism of CSS play, and
- to get an initial indication of the training benefits offered by the BSE.

Pilot Test Conditions

There were a number of constraints on the probable utility of the pilot, stemming from the conditions under which it was conducted. First, the training unit was not an AC brigade. The target training audience consisted of battalion-level personnel and the roleplayers were not primary battalion staff personnel, but assistants. This constraint limited the utility of the pilot in demonstrating how an actual brigade staff would use the TSP and plan and execute the missions.

Because of the focus on the tactical materials and on the roleplayer, interactor, and training audience portions of the TSP, COBRAS staff members filled two management roles: the Exercise Director and the coordinator/manager of subordinate and supporting unit workstation personnel. During the pilot test, they were to document the activities they performed during the exercise and later use that information to develop written exercise management guidance.

Observer TSP materials had been scheduled for development after the pilot test, because the pilot was the first opportunity to evaluate the basic observer tool, the task lists. Guidance for observers and procedures for AARs was to be developed after discussions with the Army personnel who filled the observer positions; their role in the pilot was to think about and recommend how their observer duties should be defined.

Not all of the interactor and EXCON roleplayer positions could be filled by Army personnel, so COBRAS staff also assisted in some of those positions. For interactors, this was acceptable, because the Army was able to provide about half of the needed interactors. The EXCON materials evaluation, however, could only address the actual content of the materials (e.g., the timing and information of the scripted messages) and not how easily the materials could be used by a real EXCON roleplayer who would be less familiar with the exercise.

Pilot Test Results

Observations made by the COBRAS team and the results of the discussions with participants were critical to the exercise refinement process. They indicated aspects of the TSP that needed to be revised and provided ideas to help complete the construction of other components of the TSP. The following discussion describes the pilot findings and indicates the

major revisions that resulted from the pilot. The section is organized according to the stated objectives of the pilot that were listed earlier.

Training Management Procedures

Three basic observations and outcomes contributed to defining training management procedures and guidance:

- The COBRAS personnel who participated in the exercise as the Exercise Director and the coordinator/manager of subordinate and supporting unit workstation personnel were fully occupied in managing specific personnel and activities throughout the exercise. Additionally, other project personnel performed duties in preparing and distributing materials under the Exercise Director's supervision.
- The three roles were clearly differentiated. The Exercise Director oversaw the training's implementation in a primary decision-maker role; his assistants performed logistical tasks; and the subordinate/supporting units manager saw to the smooth coordination and integration of the friendly forces.
- For each of the three roles, a significant amount of information regarding the duties and responsibilities had been documented, and was sufficiently complex to indicate that three sets of formal instructions should be prepared to provide the appropriate guidance.

After the pilot, the COBRAS team personnel who had performed the management roles met to discuss the expected requirements of the positions. Together, it was decided that the three positions should be specified in the TSP, with complete role descriptions. Eventually, the three were designated as the Exercise Director, COBRAS Coordinator, and Blue Forces Controller.

As indicated by the pilot test experiences, the roles and responsibilities were as follows. The Exercise Director provides overall leadership and is involved in every decision that may affect the ability of the training exercise to meet the training objectives. The COBRAS Coordinator arranges for personnel, supplies, and equipment in preparation for the training. This individual is also available during training to assist the Exercise Director and to keep him informed of the course the training is taking. The Blue Forces Controller monitors all activities regarding the operation of the simulation for subordinate and supporting units. This individual assists roleplayers and interactors in implementing their plans and troubleshoots simulation problems as necessary.

Performance Observation and Feedback System

During the pilot, individuals from several TRADOC schools (i.e., Armor, Field Artillery (FA), Intelligence, and Engineer) participated as observers. Because the specific nature of their duties had not yet been defined, their role was limited to examining the brigade staff task lists and considering how these tasks could be integrated into an observation and feedback system. During the course of the pilot, the COBRAS team worked with these observers to develop an effective and efficient approach to supporting the observer role as a coach, performance review provider, and AAR facilitator.

Their input on the task lists was directly responsible for revisions to the lists in order to ensure that the appropriate activities were correctly presented. Additionally, they provided input relating to the following decision needs:

- Timing and content of AARs—They concurred with the COBRAS preliminary decision to provide an AAR for each mission segment that would address the processes and products during that segment, and would emphasize the continuity of staff processes from one segment to the next. AARs would be for the full primary training audience; small group AARs would not be directly supported by the TSP (although observers would certainly be free to conduct such sessions as necessary).
- Linking individual task lists to AAR key points—Observers recommended that the two feedback systems be cross-referenced as much as possible, so that brigade staff would immediately perceive the integral relationship between individual processes and staff processes.
- Presentation modes for the task lists—Ample white space for writing notes and questions would be provided.
- Utility of sample products for use in coaching and providing feedback—Observers agreed that sample products could be useful, but were unsure whether such products, based on a brigade approach that would be different from that of the training audience, might be confusing. The development of sample products was not pursued for this TSP, although COBRAS developers did reconsider the possibility in future development.
- Observer staffing and responsibilities—Based on both COBRAS observations and the observers' remarks during discussions, it seemed reasonable to recommend that a minimum of six observers participate, each one responsible for observing one or more participants. This approach was incorporated in the development of the TSP observer guidance.

Brigade/Battalion Battle Simulation Training for Interactors and Roleplayers

For the three days that immediately preceded the pilot, the BBS site staff provided BBS training to interactors. The BBS training included basic instruction in the functions and commands necessary to operate the various workstations. There was also a mini-exercise in which interactors and roleplayers practiced conducting the MTC mission. This mini-exercise was intended to facilitate the interface relationship between roleplayers and interactors, as well as to practice the workstations operation tasks in the context of a COBRAS-like mission.

To evaluate the effectiveness of the training, the roleplayers and interactors were asked about the utility of the training they received and how the training could be improved. The responses indicated that all but a few interactors felt that the workstation training was important and effective in preparing them for the exercise. Most commented that more hands-on practice time would have been valuable.

Only a few of the roleplayers said that the workstation training, as conducted, had been useful in preparing them for their roles. However, most of the roleplayers still commented that some amount of workstation familiarization training was necessary. Topics that they suggested for such training included:

- overall workstation operations and general limitations of the system;
- resupply operations, vehicle capabilities in BBS, and transferring and evacuating equipment;

- creating routes and moving vehicles;
- cross-attachment and division of units;
- the length of time it takes to perform certain operations;
- number of rounds to kill a vehicle; and
- available BBS reports and how to read them.

Observations indicated that roleplayers and interactors who participated in the BBS training were better able to perform during the exercise than those who came to the exercise without the training. Additionally, those aspects of the exercise that were similar to the mini-exercise were performed better. COBRAS staff members also observed that training in large groups by function (i.e., combat, CS, and CSS) did not give interactors the early opportunity to work as a team at a workstation.

The conclusions on BBS workstation training needs were that:

- BBS training for interactors and roleplayers is necessary, but different programs may be needed.
- Training would be most beneficial if it was conducted at each workstation, and not in large groups defined by the types (i.e., combat, CS, CSS) of interactors.
- The mini-exercise should be modeled on the first mission to be executed.

As a result, guidance was added to the TSP that recommended: (a) the training of roleplayers in a practice exercise format, (b) using the mission to be executed as the content for the mini-exercise, and (c) the organization of training groups by workstation. Interactors would continue to receive complete workstation training. The COBRAS team believed that this approach to the BBS workstation training would facilitate a good working relationship between roleplayers and interactors, and allow roleplayers to feel comfortable that the interactors could accomplish their tasks in a timely manner.

Training Support Package Component Evaluation

For the pilot test, the TSP included materials for the roleplayers and interactors. This section discusses the evaluation of each of the three position-specific guides in general, as well as particular items within the guides:

- workstation overviews,
- workstation diagrams,
- roleplayer task lists,
- workaround job aids,
- sample subordinate unit orders, and
- report formats.

Position-Specific Guides

The overall evaluation of the guides focused on utility and ways to improve the guides. Developers focused on whether the guides helped the participants to understand and perform their

jobs, whether the guides adequately conveyed the purpose of the exercise, and how the guides could be improved. The first and last items were straightforward. However, the second issue dealt somewhat covertly with how clearly the guides indicated the purpose of the training, and therefore, the focus of each participant's role.

Although most participants commented that their guides were useful to them, observation and other participant comments indicated that few spent much time studying the guides. No significant suggestions for improving the general presentation and layout of the guides was offered, other than the specific comments noted below.

Almost all of the roleplayers were able to describe the purpose of their participation: to support training for the brigade staff. Interactors, however, did not appear to have a common understanding of this purpose. This is consistent with one interactor's comment that "...the guide needs an introduction." It is perhaps understandable, however: Interactors are the furthest removed from the primary training audience and may therefore be least clear on the overall purpose of the exercise.

The overall format and organization of the roleplayer and interactor guides did not change much as a direct result of the pilot. Feedback gained, however, did spur further review of the TSP as a whole, which resulted in numerous changes in guide formats. This review is discussed later.

Workstation Overviews

Each roleplayer guide contained a workstation overview, or workstation description. These overviews identified roleplayer and interactor positions, explained the duties of the roleplayers, and described the purpose of the workstation within the context of the training. The evaluation of the workstation overviews focused primarily on utility and completeness.

Most of the roleplayers said the workstation overviews were useful; a few participants suggested that the overviews should include more information. The majority, however, said they did not need the information at all, even though some of them did find it useful. After the pilot, the content of the workstation overviews was reorganized and portrayed in a more concise format.

Workstation Diagram

Workstation diagrams were contained in the roleplayer guides. The diagrams provided pictorial representation of each workstation's physical layout. The purpose was to orient the participants to the areas in which they would be working and the locations of information sources (i.e., BBS terminals, maps, printers). Again, the evaluation focused on utility and needed revision.

Several participants suggested that the diagrams were not necessary; there were no suggested improvements that represented any cause to keep and revise the diagrams. Therefore, the final version of the TSP did not contain the diagrams.

Roleplayer Task Lists

Roleplayer task lists were provided for all roleplayers and the OPFOR Controller. These task lists detailed all of the normal unit activities during the scenario period, and also indicated which of the roleplayers at a workstation would likely perform the task and which of the BBS consoles (combat, CS, or CSS) would provide input. The intent was to simplify position

requirements by indicating expected tasks and indicating the type of BBS information required to perform the tasks. The evaluation of the task lists focused on ease-of-use and list content in terms of accuracy and completeness.

Feedback from training participants revealed that the task lists were relatively easy to use. Comments indicated that the lists were beneficial, but that they needed to be reviewed and revised to better represent the actual operations performed during the exercise. For the final version of the TSP, certain tasks were eliminated, new tasks were added, and some tasks were revised, in accordance with specific comments and suggestions.

Workaround Job Aids

A set of workaround job aids had been prepared for the roleplayers. These aids represented descriptions of how to "work around" the documented BBS procedures to obtain certain CS and CSS effects in the simulation. To evaluate the workaround job aids, the COBRAS team focused on ease-of-use and obtaining suggestions for improvement.

Discussions and observations revealed that the workarounds were not easy to use, especially those that concerned CSS functions. Most of the CSS workarounds, however, were not often used or needed by any roleplayers except those at the brigade support area (BSA) workstation. In the remainder of the project, the COBRAS team worked to clarify, expand, and format the workaround instructions. In the final version of the TSP, most roleplayer guides contained only the workarounds that involved combat or CS operations. The CSS workarounds were reserved for the BSA roleplayer guide.

Sample Subordinate Unit Orders/Plans

The TSP included sample or model orders and plans (e.g., fire support plan) for subordinate unit (e.g., TF) roleplayers. These products were intended to facilitate roleplayer planning activities, especially when the qualifications of roleplayers did not meet the recommended standards. Another reason for including the samples was that the time for battalions to develop their orders was going to be compressed in the simulation environment of the exercise. The evaluation focused on the usefulness of and necessity of including these sample products.

The feedback was mixed. Just over half of the TF roleplayers indicated that the sample products should be included in the TSP. After the pilot, the COBRAS team concluded that the products should remain in the TSP. The reasoning behind the decision was consistent with the reasons for including the products in the first place. Another contributing factor was the COBRAS team's observation that several of the subordinate unit orders and plans, from less experienced roleplayers, did not fully support the brigade staff's planning process.

Sample Report Formats

All roleplayers, with the exception of EXCON roleplayers, received a set of sample report formats for use during the exercise. The formats were designed to facilitate the transfer of information from BBS printouts into military report format. The evaluation focused primarily on the use and utility of these job aids.

Only slightly more than half of the roleplayers used the report formats. Participants who did not use the reports reported that they fed the brigade staff information directly from the BBS

reports and that training units should use their own report formats. In the final version of the TSP, the report formats were eliminated because the COBRAS team believed that units should and would use their own report formats.

Scenario Tactical Materials Evaluation

Although limited to a slight extent by the qualifications of the participants, verifying the tactical materials was an important function of the pilot. The evaluation of the scenario's tactical materials looked at:

- the Road to War,
- initial situation package (ISP) materials,
- division operations order (OPORD) documents,
- scripted message traffic from higher and adjacent units,
- perceived tactical realism, and
- mission transition.

Road to War

The road to war was provided to all roleplayers, target training audience members, and the OPFOR Controller. It presented the background of the conflict on which the COBRAS scenario was based. The evaluation associated with the Road to War focused on the content's sufficiency and how to improve the product.

The feedback collected from participants regarding the Road to War was very positive: Most of those queried said the document was sufficient. There were no suggestions or observations that called for significant modification to the product.

Initial Situation Packages

The ISPs included information regarding the intelligence situation and the status of the brigade and its subordinate and supporting units at the beginning of the MTC mission. Every subordinate and supporting unit workstation and target training audience member received the ISP appropriate to his/her unit or role. The evaluation dealt primarily with the sufficiency of the information.

The responses were generally favorable. Most found their ISPs to be sufficient in describing the situation. The only suggestions for improvement were general in nature, including roleplayer requests for more detail. Only one roleplayer suggested that the ISPs were not needed.

Supplementing participant feedback, the COBRAS team noted a number of modifications that were needed in the ISPs. A few dealt with the types of tactical information that should be included in the packages. That is, some information (e.g., intelligence estimates) was moved from the ISPs to the EXCON prepared message list. Other revisions dealt with the accuracy of the tactical details contained in the packages.

Division OPORDs

Perhaps the most critical aspect of the scenario tactical materials was the higher-level (e.g., division) OPORDs. These products determined the tactical direction in which the brigade

staff planned their brigade-level missions. The division OPORDs were evaluated in terms of utility and problem identification.

The brigade staff was in general agreement that the division OPORDs supported the construction of doctrinally correct brigade OPORDs. The brigade staff made several additional comments, as shown in Figure 13.

Scripted Message Traffic

Scripted message traffic from the brigade's higher and adjacent units was used to guide brigade operations in support of the training objectives or performance requirements. The scripted messages were delivered by the EXCON roleplayers to the brigade staff. The evaluation of the scripted messages focused on how well the traffic cued stipulated brigade activities and how well the traffic was perceived to be representative of the same type of traffic in real combat operations. Most of the evaluation was conducted by having COBRAS team members observe the effects of the scripted messages on brigade operations and suggest modifications allowing the messages to better support the staff's training objectives.

The only comments from the EXCON roleplayers included a request for more crosstalk between adjacent units, a request for more messages that provide the intelligence picture, and a remark that the division nets would normally be busier.

The changes in the message scripts as a result of the pilot were numerous. The types of changes included message deletions, additions, clarifications, and content adjustments. Changes were driven to some extent by modifications in the scenario, such as changing the locations or units or times of events; most, however, were made as a result of the need to cue brigade staff activities. In both missions, efforts were made to increase the volume of EXCON message traffic.

Perceived Tactical Realism

Tactical realism was defined as the scenario's capability to provide a natural, operational, and doctrinal story line that would support the conduct of brigade operations of the same nature. All participants except the interactors were queried regarding this issue of realism. Not surprisingly, the target training audience members were more positive than were the roleplayers about the exercise tactical realism. Participant suggestions regarding how to make the exercise more tactically realistic were generally (but not invariably) consistent with the observations made by the COBRAS team. The suggestions and COBRAS team's response to each suggestion are provided in Figure 14.

Comments on the MTC Division OPORD	Response/Action
Needed fine tuning.	OPORD received a final review to tighten up.
The end state and objective for the brigade was unclear.	Commander's guidance revised to clarify end state.
Needed a reconnaissance and surveillance synchronization matrix for division assets.	No action taken -- synch matrix is not usually distributed to subordinate units.
Air coordination area (ACA) locations needed floors and ceilings in relation to sea level.	ACAs now reflect mean sea level.
Needed to include corps and division artillery (DIVARTY) assets.	Assets are listed in division OPORD. The assets are only minimally portrayed in simulation due to workload on control stations and the fact that the brigade is a supporting effort.
Needed to include a radar tab in the fire support annex.	Radar tab not added, but EXCON provides coverage when unit moves its radar unit.
Needed more information regarding logistics.	Details on CSS (e.g., how to get resupply) now found in Appendix 5 to Annex Q (the Division Support Command [DISCOM] service support plan).
Comments on the AD Division OPORD	**Response/Action**
Needed fine tuning.	OPORD received a final review to tighten up.
Needed to address 201 battle handover (BHO) and routes for rearward passage of lines through 201 Armor Cavalry Regiment.	Guidance given to Exercise Director to have them discontinue planning after BHO.
The southern boundary was not clearly documented.	Corrected.
Lacked specification of coverage of deep named area of interest (NAI) locations.	Deep NAIs are assigned to division/corps assets.
Needed a division rear area operations annex	Added.
Aviation annex needed for ACA, type munitions on attack aircraft.	Not needed, since aviation is not used.
The rear boundary was not clearly defined.	Corrected.

Figure 13. Participant comments regarding the division OPORD for the movement to contact and area defense and development responses.

Participant Comments on the MTC	Response/Reaction
The division front was too large.	Because of congruency requirement, the division front was not changed.
The brigade sector was too large.	Because of congruency requirement, the brigade sector was not changed.
Four TFs should not execute a MTC against three regiments.	Because of congruency requirement, the structure of friendly and enemy forces was not changed.
The mission was too easy.	Not a common comment; reevaluate in the next trial.
The medical play was too pre-programmed.	BBS automatically evacuates casualties from unit icons to the battalion aid station (BAS). Roleplayer intervention not required, but they are not the primary training audience. From the BAS on, roleplayers must manually deal with casualties and report to brigade staff.
The OPFOR was too slow, not realistically aggressive.	OPFOR has a movement table and instructions that are consistent with the TRADOC threat model. Inexperienced interactors may have contributed to the perceived lack of aggressiveness.
There were too many non-combat killed in action (KIA) before the fight began.	Noncombat KIA personnel were part of the attempt to create CSS challenge in the initial conditions. Personnel evacuation corrected with switch to BBS 4.0, but personnel accounting is still weak.
Needed more ADA assets for the size of the brigade.	Because of congruency requirement, the ADA assets were not changed.
The brigade's CSS asset quantities were too great.	CSS assets are correct for a 4-battalion brigade. The CSS assets were far too high for the FSB to stock. Put there so that resupply from Corps Support Command / DISCOM to the FSB wouldn't be necessary, so the exercise would be less complicated for roleplayers. Changed to force the FSB to seek resupply from higher. More realistic, but requires an experienced logistician at EXCON.
Participant Comments on the AD	**Response/Reaction**
Minefield locations were problematic.	Division specifies obstacle zones on an overlay.
There appeared to be no combat reconnaissance patrol (CRP) and forward security element (FSE).	CRP and FSE are built in database; may not have been reported by TFs.
The OPFOR should not allow his forces to be annihilated.	OPFOR instructions emphasize that exercise controllers need to monitor and direct when the enemy forces should "go to ground."
There was no nuclear, biological and chemical (NBC) airborne threat.	No chemical officer in the exercise and therefore no chemical play in the exercise.

Figure 14. Participant comments regarding the tactical realism of the movement to contact and area defense scenarios and development responses.

Mission Transition

The COBRAS scenario provides for a transition between the MTC and AD missions in which time is compressed. During the pilot test, a weekend break occurred between the two missions. The evaluation of the scenario's mission transition focused on mission-related difficulties and problems caused by the weekend break between the two missions.

According to the COBRAS team, no significant problems were caused by the break between missions. Participant feedback verified this observation, and thus supported the multi-mission, flexible start-pause-resume training concept proposed by the BSE architecture. Participant responses and COBRAS team observations revealed a number of problems, however, with the mission transition portion of the scenario. These comments and observations are presented in Figure 15, along with the COBRAS team's responses.

Comments on Transition	Responses/Reactions
Too few brigade scouts left after the MTC.	Exercise Director's instructions allow him to put in new forces by using the AD start point BBS tape. However, this scout problem is tied to the execution of the MTC. The decision on whether to continue with existing forces or load new ones depends on the unit's training emphasis.
Southern boundary shifted.	Done to make the defensive sector smaller, more realistic.
Needed better intelligence.	Additional scripting added to permit the brigade to develop a more detailed analysis of the enemy's posture.
Had difficulty obtaining ammunition for pre-stock from FSB.	Roleplayer-interactor problem. The instructions for both were rewritten to make it easier.
There was not enough information flow from brigade.	Will depend on the brigade staff's proficiency.
Lost "gripstocks" modified table of organization and equipment (MTOE) subline component of Stingers.	Modified database to provide gripstocks. However, the problem was corrected in BBS version 4.0.

Figure 15. Participant comments regarding the movement to contact - area defense transition and development responses.

Staffing Specifications and Participant Workload Requirements

At the time of the December pilot, the COBRAS team was still defining workstation composition in terms of the numbers of roleplayers and interactors required at each BBS workstation. Therefore, as part of the pilot, developers were carefully examining the workstation personnel workload, and asking participants about how well they were able to keep up with the requirements.

Just over half of the workstation interactors and roleplayers said that they were able to keep up with their workload. Observations also indicated that most participants were able to handle the workload well, especially during the brigade's planning and preparation activities. In fact, during these times, participants reported that they were not busy enough. The OPFOR roleplayer and interactors were the only ones who reported any difficulty keeping up with their workloads, and only during the heaviest preparation and execution phases.

In the final TSP, the recommended numbers of roleplayers and interactors per workstation are generally consistent with the findings of the December pilot. However, the recommended number of workstations was increased from 10 to 15. This accommodated putting the OPFOR activities at three workstations rather than two, increasing brigade troop and supporting unit workstations from three to six, and splitting the higher control (HICON) and EXCON workstation into two separate workstations. The TSP still recommends a single OPFOR Controller because splitting his duties would inhibit a single controller's knowledge of what was happening in the scenario.

Amount and Realism of Combat Service Support Play

Part of the BSE's purpose was to provide opportunities for the performance of CSS activities. During the pilot, COBRAS developers asked the training audience members and the roleplayers to compare the amount and realism of CSS play in this exercise to their previous training experiences.

Responses from the training audience were generally positive, indicating that the BSE provided good opportunity to practice CSS operations. For instance, the brigade commander and XO both stated that the potential was great, but was not executed. The S2 said that the amount was far greater in the COBRAS exercise than in other training events. On the other hand, the S4 indicated that CSS involvement took a back seat to the battle. Contrary to expectations, the S1 and FSB commander had no comments on the question. Among the roleplayers, responses ranged from "...fairly close" and "...fairly realistic," to "this exercise is a lot more CSS-intensive than Janus or warfighter exercises."

COBRAS team observers reported that the brigade staff did not stress CSS play during the exercise. This was judged to have been a function of the lack of brigade-level experience in the S1 and S4 staff members. Following the pilot, an effort was made to ensure the CSS status specifications at the beginning of each mission would support front-end CSS play, as this was one of the development strategies to encourage CSS activity.

Training Benefit

Perhaps the best indicator of whether or not the training lived up to its objectives is the perception of training benefit among the training audience. Participants other than the brigade staff, however, were also queried on this subject. The BSE is designed to offer the maximum benefit to all participants without distracting from the focus on the brigade staff. This concept is described in more detail in Section 4.

During post-exercise discussions, five items addressing training benefit were put to the participants. The audience for each item varied according to the content of the items, which included:

1. Agree or disagree: The experience you gained during training will be valuable to you in your military specialty. (All participants)
2. What were the top three benefits you gained from participating in the training exercise? (All participants except primary training audience)
3. Agree or disagree: Your performance improved during the course of the exercise. (Primary training audience)
4. In what areas did your performance improve? (Primary training audience)
5. Agree or disagree: The brigade staff's performance improved during the course of the exercise. (Primary training audience)

On item 1, the primary training audience members were extremely positive. Other participants were also favorable with regard to training benefits although less enthusiastically. The responses from the other participants on item 2, the follow-up to item 1, are shown in Figure 16.

The last three items were asked only of the primary training audience, and again the results were positive. In regard to item 3, about two-thirds of the training audience participants felt their performance had improved; the rest were neutral. On item 4, nearly all of the training audience agreed, and again the remainder were neutral on the issue. The areas in which the brigade staff reported improvement included:

- ". . . the ability to synchronize the combat multipliers and fight the deep fight for the brigade."
- ". . . exactly how to react to personnel issues at brigade level."
- ". . . understanding the use of combat multipliers."
- ". . . tracking and following the enemy."
- ". . . [creating] credible products in minimal time."

Other comments regarding training benefit indicated that the brigade commander felt the training was a "good exercise" and that the staff received "valuable training." The XO reported that he perceived a steep learning curve between the MTC and AD exercises.

Respondent types	Benefits
Roleplayers	
TF	• Reinforced what I learned in Armor Officer Advanced Course. • Helped me understand how the brigade and battalions coordinate their efforts. • Provided practice in writing orders. • Provided an opportunity to review the planning process.
Fire support	• Provided an opportunity to work with maneuver combat arms peers. • Got a feel for FA operations at the battalion-level. • Learned the importance of information flow.
BSA	• Served as a refresher of things I already knew, but do not use on a daily basis. • Learned a lot from other roleplayers at the BSA workstation. • Didn't learn anything new.
Engineer	• Learned about BBS.
Cavalry troop	• Gained an appreciation of logistics matters. • Learned how a brigade can use a cavalry troop.
ADA	• Gained some ADA experience. • Gained an understanding of BBS.
EXCON	• Provided a good refresher for intelligence operations. • Gained a better understanding of brigade and division operations. • Provided insight into other combat functions that ADA personnel normally do not receive.
Interactors	• Learned that scouts are very important. • Learned that CSS is critical to victory. • Learned how to operate BBS. • Gained experience in CSS operations. • Learned about tactics. • Learned about obstacle placement. • Learned more about brigade operations.
OPFOR Controller	• Provided a good review of my order of battle and tactics. • Provided a good review of battle timing.

Figure 16. Participant comments on benefits gained from the training.

Pilot Test Conclusions

Despite the fact that the pilot participants were not truly representative of the target participants, the pilot was of great benefit in furthering the development of the program. Both observations from developers and input from the participants were used in revising and completing the TSP development. There were three principal components to the pilot evaluation:

- The scenario tactical materials were tested in an integrated implementation mode, using nondevelopers who were relatively naive with respect to content.

- Existing TSP components (roleplayer and interactor guides) were tested within the context of an implementation.
- TSP contents that had been only conjectural (guides for the exercise managers, training audience, and observers) were translated into written instruction.

Summary

This section has described the first major external formative evaluation activity for the BSE, the pilot implementation. The description included the pilot test objectives, pilot test conditions, findings, and actions taken.

Section 6 will describe the formative evaluation activities that took place in preparing the TSP for a trial implementation and delivery to ARI. It will also provide a detailed description of the TSP components and contents.

SECTION 6: REVIEW AND PRODUCTION OF THE BRIGADE STAFF EXERCISE TRAINING SUPPORT PACKAGE

The previous section described the pilot implementation of the BSE TSP, and how the findings were incorporated in the TSP. It also described how several elements of the TSP were developed based on pilot test experiences.

This section describes final quality assurance review of the BSE, and gives a detailed description of the BSE implementation plan and TSP components. It is organized into four parts:

- *Internal Quality Assurance Review.* Describes the process for preparing the TSP into a final version, ready for a trial implementation.
- *The Brigade Staff Exercise Implementation Process.* Presents a description of various implementation characteristics, a timeline of the planning and preparation activities required for BSE implementation, and an exercise conduct timeline.
- *Training Support Package Structure Overview.* Gives a brief description of the structure of the TSP for the BSE and the types of materials it contains.
- *Description of Training Support Package Contents.* Provides details of how the various TSP components for the BSE were designed and the purpose each serves.

Internal Quality Assurance Review

Based on the external pilot in December, 1995, the COBRAS team made many changes and additions to the TSP. Upon the completion of these revisions, a thorough review of all components of the TSP was implemented. This quality assurance review was conducted to ensure consistency in instructional content, tactical products, and terminology within the TSP.

The review team consisted primarily of COBRAS staff members. Two Army field grade officers also participated, representing ARI and the USAARMC. During the review, each COBRAS reviewer was assigned responsibility for one or more TSP components; generally, components were assigned to the staff member who had been involved in their development. During the review, each component was reviewed for accuracy, completeness, and clarity. It was incumbent on the reviewers to investigate references between TSP components (e.g., guides) to insure inter-guide consistency. The process of addressing inconsistencies and inaccuracies was facilitated through meetings at which issues were raised and discussed by the group; each reviewer, then, was able to note the problems that existed in his/her assigned components. The Army officers also had opportunity to review the TSP, but their primary responsibility was to monitor the review process for the proponent agencies to which they belonged.

The review resulted in many revisions, most of which dealt with simple inconsistencies in wording or tactical information, or the addition of instruction to address overlooked aspects of the training. After the review-prompted revisions had been implemented, which spanned the remainder of the project, the TSP was ready for a trial implementation.

The Brigade Staff Exercise Implementation Process

Section 4 included a description of the BSE architecture that existed at the time of the analysis and design phase, relatively early in the project. After the pilot test, and in preparation

for a trial implementation of the BSE, a more comprehensive model for implementation emerged. The two principal areas for additional architecture work included the more specific designation of requirements for additional personnel and the delineation of workstations assignments. In addition, considerable design effort was spent on preparing a preparation timeline for the exercise and a schedule of events during the exercise itself.

Specifications for Additional Personnel

Initial design work indicated that, in addition to the training audience, personnel in four categories would be required:

- observers,
- roleplayers,
- interactors, and
- exercise management.

After the pilot test, and during the quality assurance review process, two additional categories were defined. The first includes brigade staff section members who would participate in order to assist the primary training audience and to provide additional realism. The second category includes simulation site personnel. Figure 17 shows the resulting delineation of personnel for the BSE.

Workstation Assignments

The training is designed to be conducted in a fixed simulation center with 10 or 14 BBS workstations and three simulated command post (CP) locations (the tactical CP [TAC], the main CP, and the rear CP) for the brigade staff. All CPs and the BBS workstations are linked by means of simulated FM radio communications representing eight brigade nets.

During BSE execution, the participants, including the primary training audience, are located according to their functions in the exercise, and as required by the simulation layout. Their placement was dependent upon satisfying the notion that they should be in the location that best facilitates the performance of their roles. Figure 18 portrays a typical simulation center layout for the BSE, and Figure 19 shows the participant locations during conduct of the exercise.

Role	Responsibility
Observers	Six observers are required: the Command Group Observer (who is usually the Senior Observer), the Fire Support Observer, the CSS Observer, the CS Observer, the Operations Observer, and the Intelligence Observer. The Senior Observer is the leader of the observer team. His responsibilities include facilitating AARs, adjusting observer assignments based on individual expertise and experience, and serving as an advisor to the Exercise Director on how the exercise is going and implement solutions
Roleplayers	Subordinate and Supporting Unit Roleplayers: Representing the major elements of the brigade: the ADA battery, FSB, engineer battalion, FA battalions, cavalry troop, and four TFs. Three to four roleplayers are recommended to staff each of these functions to effectively control the actions relevant to the unit. For example, four roleplayers are recommended for each TF, one each for: operations, intelligence, fire support, and logistics functions. EXCON: The role of the division staff is played by six or more roleplayers assigned to the EXCON workstation, representing the Division Operations Officer (G3), Division Intelligence Officer (G2), fire support, air defense, engineer, and CSS functions. OPFOR: An OPFOR Controller would oversee operations at three BBS workstations, keeping the enemy activities within the intent of the exercise.
BBS Interactors	Three interactors (combat, CS, and CSS) would be assigned to each friendly unit workstation; OPFOR workstations required two interactors each (combat and CS).
Exercise Management	The Exercise Director, COBRAS Coordinator, and Blue Forces Controller.
Brigade Staff Support	Twelve members of the brigade staff sections, including staff non-commissioned officers and radio operators.
Simulation Site Staff	A nonspecific requirement for support from the simulation site staff. At least one staff member should participate fully throughout the exercise

Figure 17. Roles and responsibilities of Brigade Staff Exercise participants.

Planning and Preparation Timeline and Exercise Event Schedule

Preparation on the part of the Exercise Director and COBRAS Coordinator is extensive, beginning some 12-16 weeks prior to the scheduled conduct of the exercise. Observers should also spend up to a week in preparing themselves to observe and provide feedback. Roleplayers and interactors spend two to three days in training, prior to the start of the BSE.

The implementation process for the BSE has two major phases: before the exercise, and during the exercise. The planning and preparation process timeline shown in Figure 20 is extracted from the "Brigade Orientation Guide." It indicates the primary decision and coordination activities that should go on during the weeks prior to actual implementation. Figure 21 then shows the timeline of activities during actual conduct of the exercise. Both timelines are flexible with respect to when activities need to be accomplished, although the exercise timeline (Figure 21) requires that certain events be synchronized with the simulation run time.

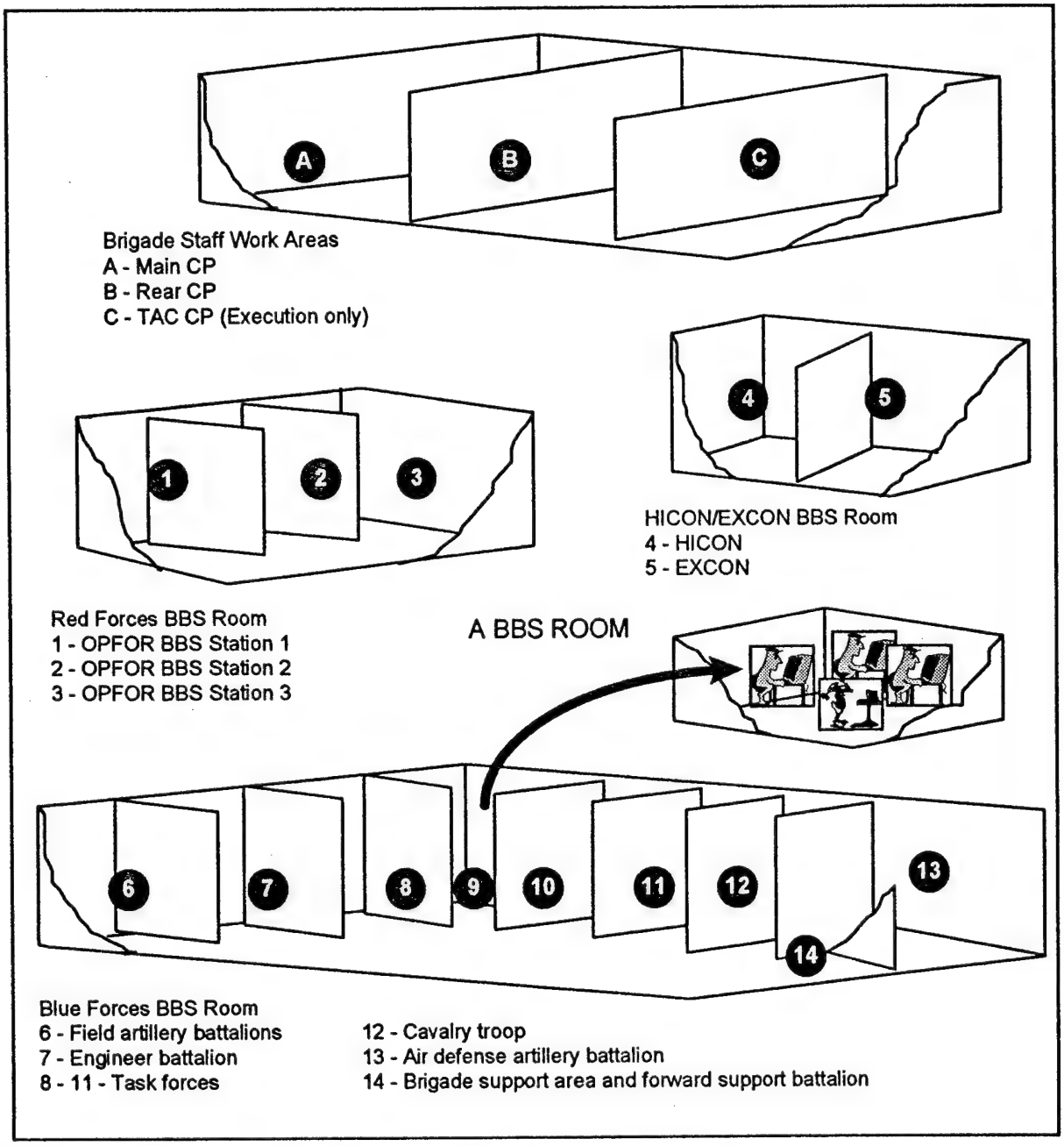

Figure 18. Layout of work areas for the Brigade Staff Exercise.

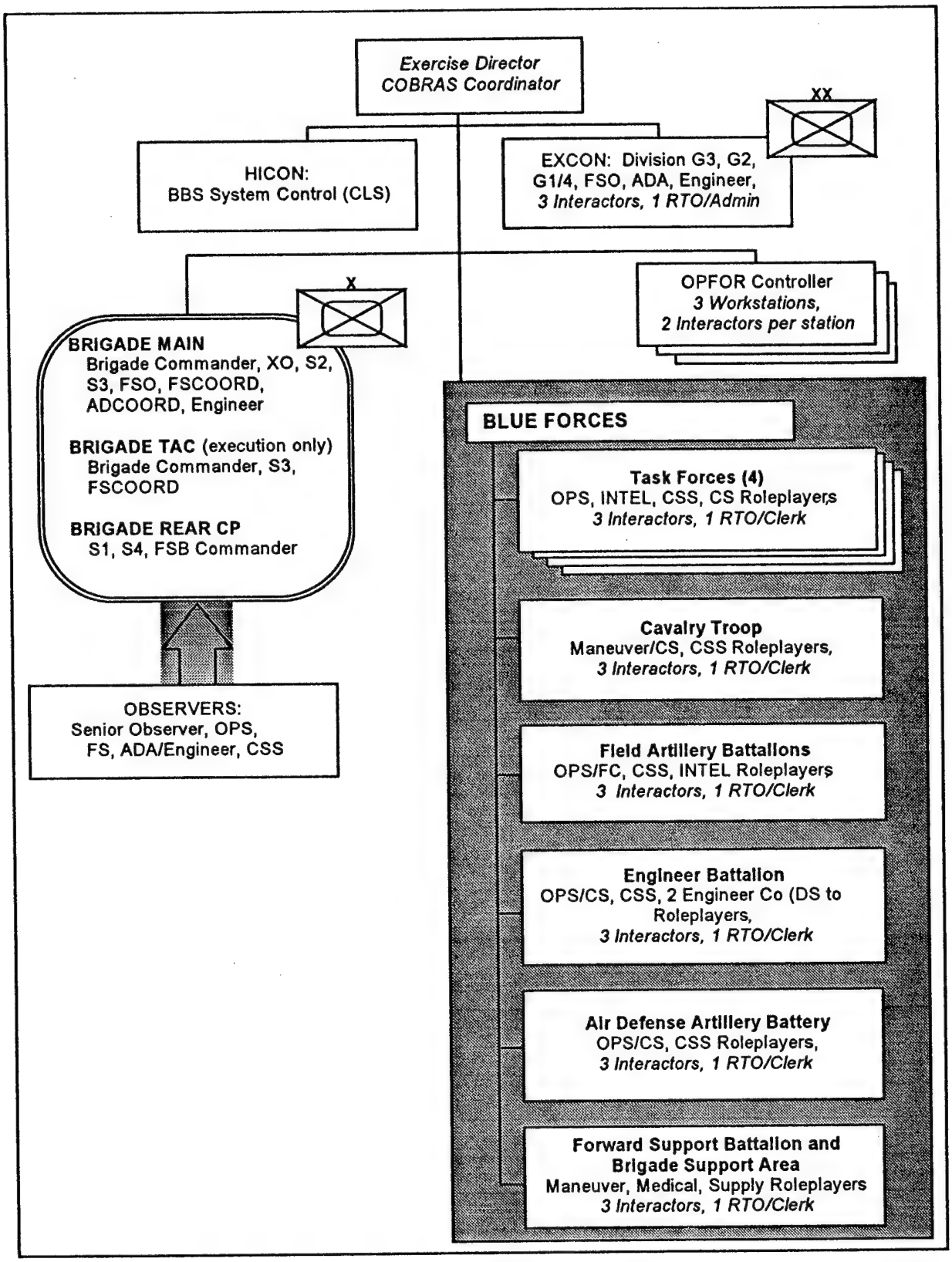

Figure 19. Participant locations during conduct of a Brigade Staff Exercise.

Timing	Activity
---	Decision is made to conduct brigade staff training using the COBRAS BSE. Entered on training calendar.
Per SOP	Schedule BBS facility.
T-18 weeks	G3 designates personnel to serve as Exercise Director and COBRAS Coordinator. Exercise Director and Brigade Commander meet to discuss roles and expectations.
T-14 weeks	Exercise Director and Brigade Commander select option for mission(s) to conduct. Exercise Director develops preliminary exercise schedule.
T-12 weeks	COBRAS Coordinator prepares taskings for personnel; released to units. COBRAS Coordinator confirms facilities schedule.
T-4 weeks	COBRAS Coordinator issues participant guides and readahead materials to: • Training audience (through brigade XO) • EXCON G3 Roleplayer • OPFOR Controller • Observers
T-2 weeks	COBRAS Coordinator issues guides and readahead materials to Blue Forces roleplayers. Simulation site personnel load and try out BBS tapes. Orientation briefing for all participants. Brigade commander and staff study readahead materials and references and get familiar with the tactical situation. Brigade commander and XO decide on support staffing. Brigade XO arranges for copies of the overlays to be made. S2 uses readahead materials to begin Intelligence Preparation of the Battlefield (IPB).
T-3 days	Simulation site personnel and Blue Forces Controller train and rehearse interactors and roleplayers. Roleplayers and training audience set up their CPs in the exercise area. Division (EXCON) roleplayers rehearse division order with observers. Exercise Director and COBRAS Coordinator conduct final readiness check of exercise support. Brigade commander and XO conduct final readiness check of brigade staff.

Figure 20. Planning and preparation timeline for Brigade Staff Exercise implementation.

Mission	Training Hours Total/ Mission	Scenario DTG	Training or Scenario Activity	BBS Activity
MTC	1/1	-	Orientation, brigade update	
	2/2	**130600**	**Receive mission, division OPORD brief**	
			Mission analysis	
			Mission analysis brief and commander's guidance	
	6/6		**AAR: Mission Analysis**	Pause 131000
			COA development	Resume 131000
	9/9		**AAR: COA Development**	Pause 131200
			Wargaming	Resume 131200
	14/14		**AAR: Wargaming**	Pause 131600
			COA comparison	Resume 131600
			COA decision brief, WARNO #2 with task organization	
	17/17		**AAR: COA Comparison**	Pause 131800
			Order development and reproduction	Resume 131800
	22/22		**AAR: Order Development**	Pause 132200
			Rehearse brigade OPORD brief	Resume 132200
	24/24	**132300**	**Brief brigade OPORD**	
			Subordinate unit planning; brigade preparation	
			Subordinate unit backbriefs; brigade preparation	
	Compress 3 hours, 140500 to 140800			
		140800	**Brigade rehearsal**	**Resume 140800**
			Subordinate unit preparation	
	33/33		**AAR: Rehearsal**	Pause 141100
	Compress 12 hours, 141100 to 142300			
		142300	Complete preparation	Resume 142300
		142400	**Move from AA SMITH to ATK CLUB.**	
		150300	**Begin reconnaissance**	
		150600	**Begin MTC (LD time)**	
		151000	Consolidation & reorganization, prep for transition	
	46/46		**AAR: Execution and consolidation/reorganization**	Pause 151100. ENDEX Option 3 (MTC).
AD	**47/1**	**151100**	**Receive mission, division OPORD brief**	**Resume 151100. STARTEX Options 4 (AD-DATK), 5 (AD).**
			TF reorganization, CSS activities, mission analysis.	
		151200	CSS activities; mission analysis.	

Continued on next page

Figure 21. Timeline of activities during conduct of the exercise.

Mission	Training Hours Total/ Mission	Scenario DTG	Training or Scenario Activity	BBS Activity
	52/6		**AAR: MDMP planning through wargaming** CSS activities. Order development, reproduction	Pause 151500 Resume 151500
	55/9		**AAR: Order Preparation**	Pause 151800
		151800 **152400**	**Brief brigade OPORD** Subordinate unit planning, CS/CSS activities; begin recon/counter-recon. **Brigade rehearsal.** Subordinate unit planning; CS/CSS activities; counter-recon continues.	**Resume 151800**
	64/18		**AAR: Rehearsal**	Pause 160200
		  160600 161300 (approx.)	Defense preparation; CS/CSS activities; counter-recon continues. **Defend NLT** Consolidation and reorganization, preparation for mission transition; CSS reporting	Resume 160200
	77/31		**AAR: AD Execution, Consolidation, and Reorganization**	Pause 161400. ENDEX Options 2 (MTC-AD), and 5 (AD).
	Compress 50 hours, 161400 to 181600			
DATK	78/1	 181600 **181700**	Reorientation. Brigade update Situational update, CSS reporting **Receive mission, division OPORD brief** Mission analysis	STARTEX Option 6 (DATK) Resume 181600
	81/4		**AAR: Mission Analysis** COA development	Pause 182100 Resume 182100
	87/10		**AAR: COA Development**	Pause 182300
			Wargaming	Resume 182300
	92/15		**AAR: Wargaming**	Pause 190300
			COA comparison COA decision brief, WARNO #2 with task organization	Resume 190300
	95/18		**AAR: COA Comparison**	Pause 190500
			Order development, synchronization, and reproduction	Resume 190500
	100/23		**AAR: Order Development**	Pause 190900
		 191000	Rehearse brigade OPORD brief **Brief brigade OPORD** Subordinate unit planning; brigade preparation Subordinate unit backbriefs; brigade preparation	Resume 190900

Continued on next page

Figure 21 (continued). Timeline of activities during conduct of the exercise.

Mission	Training Hours Total/ Mission	Scenario DTG	Training or Scenario Activity	BBS Activity
		191700	**Brigade rehearsal** Subordinate unit preparation	
	111/34		**AAR: Rehearsal**	Pause 191900
			Continue preparation	Resume 191900
	Compress 5 hours, 192100-200200			
		200200	Complete preparation	Resume 200200
		202300	Start movement from AA Begin reconnaissance	
		210300	**Begin DATK (LD time)**	
		210900+	End of mission	
	125/48		**AAR: Execution**	ENDEX Options 1 (MTC-AD-DATK), 4 (AD-DATK), and 6 (DATK).

Figure 21(continued). Timeline of activities during conduct of the exercise.

Training Support Package Structure Overview

Following the pilot test, construction of the TSP for the BSE proceeded according to a plan that considered both the content of the TSP components and the organization of those components. This plan had initially been drafted during the design stages, as described in Section 4.

This TSP structure required further customization to account for the requirement that the BSE be implementable under six different options[13], because every option required the distribution of a different set of materials. For instance, if a brigade performs only the AD mission, then participants require tactical materials that relate only to the end-state of the MTC and the planning of the AD; they need no information about the DATK mission.

Two alternatives were considered to provide the TSP variants for the six implementation options. The first was a strategy in which a TSP would be created for each option. Under this alternative, a single training management component focusing on option selection would be supplemented by six option-specific TSPs. Because of the sheer magnitude of the production and materials delivery requirement, this option was deemed unfeasible.

The second strategy was to produce one TSP that would account for all implementation options and contain all of the necessary materials. This alternative would require the development of distribution instructions describing how to organize option-specific TSPs from the components included in the base TSP. This strategy was eventually selected as the one most likely to facilitate the distribution of the program among AC brigades.

[13] The options are described in Section 4, "Training Program Design" and shown in Figure 11.

Within the COBRAS team, the term used to describe the BSE TSP was "The Box." This identifier was useful because it referred to the *entire* set of TSP materials, without referencing any one set of materials required for implementing any of the six exercise options. The Box consisted of a single set of guides, books, and simulation system tapes that contained both instruction and materials required by all implementation options. Upon the selection of any implementation option, a brigade could select those materials needed for that option. The Box for the BSE contains all of the BSE materials, which must be copied, assembled, and distributed according to the demands of the individual implementation option selected. The option-specific TSP created during this process provides the guides and materials for each training participant, pursuant to his/her role in the exercise. Details of the contents of The Box are presented in Figure 22.

TSP Category	TSP Item
Exercise Management	• Exercise Guide for the Exercise Director, COBRAS Coordinator, and Blue Forces Controller, with Appendixes • Brigade Orientation Guide
Tactical Materials	• Corps Concept (MTC, AD, and DATK) • Division Orders and Tactical Materials (including overlays)
Participant Guides and Materials	Training Audience: • Training Audience Guide (generic, for all 11 Primary Training Audience members) • XO Guide to Unit Preparation and Materials Distribution • ISPs and start of exercise (STARTEX) Position Overlays (per staff member, per mission) • Task Lists (per staff member, per mission)
	Observers: • Observer Guide (generic, for all 6 Observers) • Task Lists (per Observer, per mission) • Observer AAR Briefing Materials
	Roleplayer Teams: • EXCON Roleplayer Guide • TF 1-5 Roleplayer Guide • TF 1-7 Roleplayer Guide • TF 3-5 Roleplayer Guide • TF 1-80 Roleplayer Guide • OPFOR Controller Guide • Cavalry Troop Roleplayer Guide • Fire Support Roleplayer Guide • Engineer Roleplayer Guide • FSB Roleplayer Guide • ISPs and STARTEX Position Overlays (per roleplayer team, per mission)
	BBS Interactors: • Blue Interactor Guide (for Combat, CS, and CSS Interactors at all 9 Blue workstations) • HICON/EXCON Interactor Guide (for Combat, CS, and CSS Interactors at 2 workstations) • Red Interactor Guide (for Combat and CS Interactors at 3 Red workstations)
Simulation Materials	Tools for initializing BBS and making changes or corrections: • BBS TOE and Initialization Book • BBS Archive Book • BBS System Initialization Tapes

Figure 22. Organization of the Brigade Staff Exercise training support package.

Description of Training Support Package Contents

The BSE TSP was developed through an iterative process of brainstorming sessions, material construction, and material tryouts. The principal criterion that drove the effort to

produce quality TSP components was whether or not the products were supportive of the functions they were intended to serve.

The individual components that comprise the TSP are described below. The discussion highlights component functions and describes the development processes as appropriate.

The materials to be described are in the following categories:

- exercise management materials (the Exercise Director, COBRAS Coordinator, and Blue Forces Controller),
- primary training audience materials,
- subordinate and supporting unit roleplayer materials,
- EXCON roleplayer materials,
- OPFOR Controller and roleplayer materials,
- observer materials,
- interactor materials, and
- simulation site staff materials.

Exercise Management Materials

Exercise management refers to the processes of planning, preparing for, and overseeing the conduct the exercise. Most of the exercise management guidance and tools are contained in the "Exercise Guide for the Exercise Director, COBRAS Coordinator, and Blue Forces Controller" (generally referred to as simply the "Exercise Guide"). It is these three individuals who perform the managerial and administrative duties required by the BSE.

A separate guide, the "Brigade Orientation Guide," gives an overview of the program and the preparation activities to the participating brigade. It is intended for early use by the brigade commander and XO, and details the support requirements, the missions and options, and considerations for selection of an appropriate option.

The contents of the Exercise Guide are described below.

Planning and Preparation Timeline

This timeline (shown in Figure 20) specifies activities from 18 weeks to three days prior to training. This encompasses events from entering the BSE into the training schedule to training BBS interactors in simulation application. Although the timeline indicates a general schedule, it does not inform the brigade *how* to conduct normal and routine procedures that would be required during the conduct of any training event. The timeline is to be used in conjunction with the unit's existing training management tools that further specify how to plan and prepare for training with the BSE.

The concept of a planning and preparation timeline is not unique to the COBRAS program; similar information is provided in the VTP "Orientation Guide." The information that specifies planning and preparation activities, however, is more critical in the COBRAS program. Not only does a unit have to schedule training and task the training audience, as in the VTP, they

also have to work with their division and/or sister brigades to acquire personnel who can serve in the positions such as observers and Exercise Director; this requires careful coordination.

Guidance on Selecting Mission Training Options

Explicit and detailed guidance is included regarding how to select mission training options. Its purpose is to maximize the probability that brigades will be able to select missions with the training objectives most commensurate with their training needs. Guidance includes a brief description of the total scenario and an explanation of each option. The guidance also includes information on the specifics of the brigade staff decision-making process for each mission and the similarities in brigade staff activities among the missions. Providing an exercise selection guide that describes content and training objectives is consistent with the approach taken in the VTP "Orientation Guide." The "Brigade Orientation Guide" contains essentially similar information, allowing the brigade commander and the Exercise Director to work together in determining the scope of the training to be conducted.

Planning and Long Term Preparation

Several elements are included in this guidance. They include:

- The scenario timeline, which provides a concise summary of scenario events (a modified copy is shown in Figure 21). It shows when elements such as WARNOs, INTSUMs, and other products are issued as cues. It also identifies scenario times when the simulation is running and periods when time is compressed by "jumping over" periods of the scenario. Alterations to the scenario timeline, unless carefully made, will cause the untimely delivery of reports (e.g., INTSUMs) and the dislocation in time of every event occurring after the alteration period. The scenario timeline was under development from the first scenario design efforts through the conclusion of the project, as scenario events were continually adjusted to cue the performance of brigade staff activities included in the training objectives.
- The exercise schedule, which links scenario times for key brigade events to training times. It is intended to provide a coordinating schedule for the overall exercise by specifying events such as issue of the brigade order, rehearsals, anticipated AAR times, and the start of mission execution (LD time). Development of the unit's customized exercise schedule is initiated prior to training and is completed after the brigade staff has planned its timeline for mission planning, preparation, and execution (during mission analysis). Developing the exercise schedule shells and model required an extensive effort to relate the scenario's events to the activities of the brigade staff. The effort also involved integrating the details of when the simulation would and would not be running, points in the scenario at which the end-of-the-day breaks would occur, and AAR schedules.

  Because of the amount of information contained in this type of schedule, it is necessarily a lengthy and very detailed schedule. Furthermore, it had to be designed to facilitate quick completion by the brigade (usually the XO) during conduct of the training. The exercise schedule does *not* include enemy activities, because the training audience is involved in its creation and information such as this would compromise the exercise.

- Types and numbers of personnel required. The recommended participant numbers are based on the optimal implementation model. Regarding qualifications, the TSP specifies branch codes, military occupational specialty (MOS) specifications, and functional descriptions that indicate the types of personnel that should fill each position.

  In the pilot implementations of the BSE (described in Section 5), the recommended staffing of the exercise was modified, in terms of participant qualifications, in accordance with personnel availability. As expected, certain problems were observed, including the loss of exercise momentum and less timely, appropriate, and accurate combat information to the training audience. In the final revisions of personnel requirements, position qualifications were stated as definitively as possible, with cautions concerning modifications.

- Coordination with the simulation site, including a description of types and numbers of work areas, the simulation configuration, and the radio communication network required during the exercise. Addressing the coordination of the exercise with the simulation site is critical to ensuring that the training will take place as intended. The guidance on this issue serves primarily as a reminder to ensure that the coordination is addressed.

- Reproduction and assembly of the TSP materials, based on the implementation option selected. The Exercise Guide describes the types and organization of the materials, indicates the materials needed for each implementation option, and provides copying and assembly instructions. Such specific guidance is required because the TSP (The Box) as provided to the unit contains only one copy of most materials and is not tailor-made for any implementation option.

- Preparing a Letter of Instruction (LOI). The LOI should include information regarding personnel tasking, facilities and equipment, and scheduling of pre-exercise training sessions and briefings that will occur during the "near-term preparation" time frame. The LOI is to be issued only after the mission option has been selected and the daily training schedule has been confirmed.

Near Term Preparation

Guidance on near term preparation (i.e., within the final two to four weeks prior to the exercise) addresses several topics:

- Preparation of the work areas in the simulation center. These areas include the CP areas and a room for the AARs. This guidance is actually more in the nature of reminders on work area requirements, rather than actual instructions on how to set up a CP or an AAR room.

- Materials distribution. This guidance includes a job aid that indicates when and to whom the copied materials should be distributed. The "when" aspect of the guidance is particularly important. If certain ISP tactical materials (e.g., INTSUMs) are distributed prior to the time at which the brigade staff would normally receive them, the staff will be privy to scenario events that they otherwise would not know about before execution. Thus, the outcome and value of the exercise would be diminished; worse, the tactical situation can quickly become confused for all participants.

- An orientation briefing to provide information to the participants about the exercise and their roles and responsibilities. The Exercise Director can use his/her own format and slides, modify the slides provided in the TSP, or simply use the slides as they are. Topics include assignments and responsibilities, readahead materials (e.g., guides), the training schedule, required preparation activities, and final preparation and training schedules. The orientation is provided in the form of sample briefing charts (hard copy and PowerPoint®).
- A general description of the recommended preparation and training activities for all participants is provided for the exercise managers. Its intent is to make exercise managers aware of the preparation and training needs of each participant type.
- Rehearsal of the division order brief. The discussion suggests the rehearsal participants and attendees, identifies the key points to be discussed during the rehearsal, and indicates the objectives of the rehearsal. Because the EXCON roleplayers (as the DRC), along with the Exercise Director (as the division commander), are the principal participants in the rehearsal, the key points to be discussed during the rehearsal are also contained in the EXCON Roleplayer Guide.

  The division OPORD brief is a key exercise event, providing the brigade staff with the tactical information they need to begin their staff planning process. Given this, rehearsing the division OPORD brief is a key preparation event for the Exercise Director and the EXCON roleplayers. This rehearsal determines the brief's effectiveness, orients exercise participants and attendees (e.g., EXCON roleplayers, observers) to the tactical situation, and allows them to resolve issues regarding how they might answer tactical questions regarding the details of the division and corps missions. Guidance for how to address such questions is also provided.

Controlling the Training

This guidance covers four aspects of managing the exercise itself:

- Starting the exercise: Describes the activities that should occur immediately prior to the exercise. It is intended to keep managers aware of whether or not the participants are ready to begin the brigade's planning and preparation process.
- During the brigade's planning and preparation process: Control of the OPFOR, EXCON, and simulation activities. Even during planning and preparation, when the brigade staff exerts little command influence on the activities of subordinate and supporting units, the Exercise Director must be aware of the extent to which the OPFOR Controller, EXCON roleplayers, and simulation events contribute to supporting the staff's performance of the training objectives.
- During the mission execution phase: Addresses synchronization issues, times at which the simulation can be paused, how to monitor the fight, what to do when the exercise does not go as planned, and guidance on times when the White Cell should be making critical decisions about the course of the exercise. The White Cell is an integral part of the BSE. It consists of the COBRAS Coordinator, the senior EXCON roleplayer, the HICON operator, the Senior Observer, the OPFOR Controller, and the Blue Forces

Controller. Its role is to monitor activities in all roleplayer and training audience areas, and to advise the Exercise Director in support of the staff's training objectives.

- AAR arrangements: Addresses the times at which the AARs should occur and how the times can be adjusted. The Senior Observer is the leader with regard to AAR preparation and facilitation. Here, the guidance only serves to remind the Exercise Director that he should be prepared to contribute to the AAR in support of the Senior Observer (usually in the role of division commander).

Mission-Specific Exercise Conduct Information

For each mission, detailed information is provided about the scenario, how the scenario is designed to cue the performance of the training objectives, and the decisions that should be made to keep the training on course. This guidance is intended to help the Exercise Director and White Cell keep the exercise on course, in terms of the training objectives. Without such guidance, the tendency is for exercise controllers and OPFOR personnel to get carried away with providing increasingly difficult challenges to the brigade staff. While it is acknowledged to be important that the training audience be challenged, it was also considered important that they have a chance to see success as the outcome of correct performance.

The Implementation Model

This section of the Exercise Guide describes the intended implementation model and stresses the problems caused by deviating from the model. The information includes a discussion of how the training is structured to fulfill certain training needs, and addresses some commonly suggested departures from the model and their probable effects on the exercise. These modifications include:

- extending the training day,
- expanding the training audience,
- changing the training environment,
- accelerating the brigade staff decision-making process, and
- changing METT-T.

This information is intended to head off modifications that may be problematic, while at the same time assisting training managers to make necessary variations in the training's implementation in such a way that the impact is minimized.

Primary Training Audience Materials

Although the primary purpose of the BSE is to train the brigade staff, the guidance and materials provided to these individuals is relatively minor when compared to that provided to other types of participants. This is because the brigade staff's role in the exercise is to perform as they would in an actual combat situation. The brigade staff neither has to work with the simulation to perform their roles, as do the subordinate unit roleplayers, nor do they have to think about controlling the scenario, as do the Exercise Director and EXCON roleplayers. Thus very little in the way of exercise guidance needs to be provided to them.

The greatest need for the primary training audience concerns their individual and collective preparation. All the information provided to the primary training audience members prior to the conduct of the exercise is contained within the training audience guide, ISPs, and lists of brigade staff training objectives and tasks. The ISPs and task lists are tailored for the individual training audience positions, as well as for the specific missions. Once the exercise begins, the brigade staff receives additional tactical information in the form of the division OPORD and briefing; this is the event and the information that cues their performance. The brigade staff task lists are described in Section 4 of this report. The training audience guides include the information described below.

Exercise Intent and Preview

This section contains an overview of the exercise providing a general description of the purpose of the exercise and how the exercise is conducted. The overview also states the four primary performance objectives of the BSE, which include:

- performance of the all mission phases,
- performance of the DDMP and MDMP,
- production of planning and preparation products, and
- integration of CS and CSS functions.

This information explains how the BSE can fit into a unit's training plan (i.e., that it is meant to be conducted as a building block exercise in preparation for combat training center rotations or unit deployments) and the areas on which the training focuses (i.e., providing practice opportunities for developing and refining brigade staff procedures). It also identifies the missions and implementation options, describes the training environment, and explains how BBS drives the training, but is transparent to the training audience.

Target Audience Composition

The training audience guides include a listing of the members of the primary training audience and a recommended listing of brigade staff assistants to include in the exercise. This information is intended to help the brigade staff decide which staff assistants to bring to the training. Staffing levels should be sufficient for performing routine CP duties to free the primary audience to conduct planning and execution procedures. The list of recommended staff assistants considers who might best assist the brigade staff, given the limited space in typical simulation site CPs.

Performance Objectives

Within the guides is provided a brief overview of general training objectives. The discussion refers to the individual task lists that are included as an appendix. The discussion explains that the training focuses on staff interaction and not on command responsibilities. It also explains how the scenario may require either the DDMP or the MDMP, or both.

Scenario

The scenario section includes general descriptions of the brigade's task organization, the tactical location, the OPFOR, and the tactical situation, with reference to the ISPs and the Road To War (included as appendixes). The ISPs contain specific details about the scenario for the

selected mission(s), including information regarding the locations and status of the brigade at the start of each mission. The ISPs also contain overviews of events leading to each mission, overlays showing starting positions, and information that allows for preparation activities such as the IPB and initial staff estimates.

It is considered essential that the staff prepare collectively, as well as individually. Each staff member receives only the status information appropriate to his/her position. They must pool their information in order to get an accurate picture of the situation.

Observation and AAR Procedures

For the training audience, this section describes the kinds of personnel who will serve as observers, indicates the extent and types of interaction expected between the brigade staff and observers, and indicates the recommended schedule and focus of AARs. The emphasis is on observers as mentors rather than as evaluators. Feedback may be generous and directive, or sparing, as needed.

Brigade Staff Preparation

Although most brigade staffs are expected to know, in general, how to prepare for an exercise, there is enough that is new about the BSE to warrant inclusion of this guidance. It lists the preparation materials required (i.e., ISPs and task lists), instructs the brigade staff to review the requirements for the DDMP or MDMP, and instructs them to review their tactical standard operating procedure (TACSOP) and staff processes. It also includes a reference list of doctrinal publications to facilitate review of the DDMP, and indicates that an MDMP process is described in the brigade staff task lists.

Special instructions for the brigade XO inform him that he is the prime point of contact between the brigade staff and the Exercise Director, and that he is responsible for distributing the guides, ISP, and task lists to the primary training audience personnel.

Although the TSP and the design approach are intended to keep unit preparation time minimal, they must spend some time getting themselves informed on the tactical situation. In a real-world situation, they would be coming to a mission with some degree of knowledge of the preceding events or the unit's readiness levels. The TSP materials compress the information as much as possible, and provide a minimum of contextual information to enable the staff to comprehend their role and position in the corps and division operation.

Supporting and Subordinate Unit Roleplayers

In the BSE, supporting and subordinate unit roleplayers are responsible for extracting battlefield information from the simulation and communicating that information to the brigade staff, and receiving information from the brigade staff and ensuring it is carried out in the simulation. The purpose is to form a seamless exchange of information between the brigade staff and the simulation, in which the brigade staff itself does not communicate directly with the simulation. Rather, all of their communications replicate real-world tactical communications.

Given this function, the TSP components for roleplayers focus mainly on explaining how to work with the simulation and, specifically, with the simulation interactors, to achieve a realistic environment for the brigade staff. The materials do not provide instruction on how to be a TF commander or S2, how to control fire support operations, and so on. It is assumed (and it is

specified in the Exercise Guide) that roleplayer personnel are qualified to perform in the roles they are portraying.

The TSP components provided to roleplayers are described below.

Exercise Preparation

Under exercise preparation, information for roleplayers of the supporting and subordinate units includes:

- Recommended staffing levels for each workstation and the general duties of each type of roleplayer. In general, each subordinate unit workstation will have four roleplayers, covering operations, intelligence, fire support, and CSS functions. The workstations for the supporting units (i.e., FSB, FA, engineers/air defense) are staffed more specifically for the required functions. Each roleplayer guide contains this general list of responsibilities.
- Layout of the workstations along with a graphic depiction of the workstation setup (i.e., workstation diagrams) and roleplayer duty descriptions. The workstation diagrams were developed for the BBS site at Fort Knox, but are easily translatable to other BBS sites. The roleplayer duty descriptions are general in nature and describe typical staff performance aspects.
- Specific preparation tasks to be completed immediately prior to the exercise, including:
  - setting up the workstation,
  - reviewing the planning requirements,
  - conducting radio checks and becoming familiar with the communication configuration,
  - reviewing reporting requirements,
  - conducting BBS training, and
  - reviewing the tactical situation.

  Most of these tasks are facilitated by later components included in the guides (discussed below, along with an explanation of how roleplayers should function during the exercise).

Exercise Conduct

This guidance describes how the roleplayers should interact with the brigade staff and who they should consult in case of technical or other problems. Roleplayers control their units and communicate with the brigade staff just as they would if the unit were live. This includes following the brigade's guidance and orders, and the brigade and battalion SOPs.

From BSE pilots, developers realized that technical difficulties or other types of role related questions would arise. The guidance refers roleplayer questions to the Blue Forces Controller. Establishing a problem-solving loop for all exercise participants was an important aspect of the development of the BSE.

Workstation Task Lists

Task lists are provided for each roleplayer at each workstation, and are organized chronologically according to the mission phases. Several tasks are noted as "repeated," indicating that they will be required throughout the mission. For each task, notations indicate which roleplayers are involved in performing the task and which BBS interactors, if any, also participate.

Workstation task lists were developed in response to an observed need for structuring subordinate unit actions. The development began with a discussion of the roleplayer activities at a selected workstation for all missions. Each roleplayer action was recorded. After the session, training developers reviewed and compiled the roleplayer actions into a succinct representation of the roleplayer duties at that workstation. Later, these actions were refined to the point where each action was associated with an individual roleplayer, as well as with a specific BBS interactor (i.e., combat, CS, or CSS).

Planning Guidance and Job Aids

Minimal guidance is provided to ensure the roleplayers do at least the following to develop their plans:

- develop and post task organizations;
- develop enemy situation templates through discussion with the brigade S2 and examination of the brigade OPORD;
- post the locations and graphics of adjacent units to assist battle tracking;
- develop a mission statement for use in the brigade rehearsal;
- develop a service support plan;
- develop CP locations; and
- decide, within each workstation, which roleplayers will control which units.

In the BSE, subordinate unit staffs support the brigade planning process by conducting an abbreviated planning processes for their own units. Because the subordinate unit roleplayers do not have the support of their full staffs, the TSP provides guidance and job aids to help them complete the minimum planning tasks required to support the brigade staff's planning process.

Job aids provided to assist in subordinate unit planning processes vary by workstation. The job aids for the fire support workstation roleplayers, for instance, include a brigade mission form, mission analysis worksheet, commander's guidance form, restated mission form, questions to higher form, fire support matrix (blank), and execution matrix (blank).

Simulation Operating Procedures

Two sections of guidance are included:

- CSS Notes. These notes provide background information for conducting CSS activities in accordance with the design of the scenario. The notes are organized according to the following operational categories: maintenance, transportation, supply, and personnel. The need for CSS Notes was initially discovered during scenario pilots in which the

project team attempted to cause the occurrence of certain events to cue training objectives. Once the team realized that CSS operations had to be executed according to specific rules, they began to document procedures to do so. These procedures were refined during subsequent scenario pilots and the external pilot of the BSE.

- BBS Workarounds. The workarounds are presented in a series of charts that portray procedures for employing BBS in the BSE. Each chart presents the actions needed to accomplish the workaround and indicates who should perform the actions. The workarounds cover close air support (CAS), multiple launch rocket system (MLRS), suppression of enemy air defense, copperhead, task organization, medical support, personnel replacement flow, replacement supply flow, and CS VII (end item) replacement flow.

Communications

Two sets of information are included:

- Communications nets and call signs. Depicts a network which will support the BSE. The chart indicates the suggested nets and which locations should have radios set on those nets. The network does not try to replicate all of the nets a brigade would have in the field. Some nets are omitted; others are combined into a single net. This configuration is useful for a simulation facility where resources and space are limited.
- Report formats. Blank versions of commonly used report forms. The sample reports in the guide are extracts from FM 71-3 (DA, 1995). In some cases, the report formats were modified to better reflect the outputs produced by BBS. A reports matrix indicates which units send specific reports, to whom the reports are typically submitted, when the reports are required, the report medium (i.e., voice or hard-copy message), and precedence (i.e., immediate, priority, flash). The reporting scheme matrix was developed through an examination of the content of FM 71-3.

  Also included is a "Subordinate Units to Brigade Reporting Matrix" that facilitates the provision of critical information to the brigade staff.

Scenario Background

The scenario background is provided in the Road to War, which describes the events that lead up to the missions conducted by 3rd Brigade. The Road to War was developed during the initial scenario design effort (described in Section 4).

Supporting and Subordinate Unit ISPs

As with the training audience ISPs, these provide information on locations and status of the specific supporting or subordinate unit at the start of each mission. The packages contain overviews of events leading to the mission, tactical overlays showing starting positions, and information for initial preparation of status charts. Each roleplayer team receives only the status information appropriate to his/her unit.

Exercise Control Roleplayer Materials

Personnel at the EXCON workstation help to provide a realistic training environment for the brigade staff by controlling the brigade actions and keeping them consistent with missions and

training objectives. The EXCON roleplayers exert control by communicating as higher (division) and adjacent headquarters, and by providing message traffic to simulate the input that a brigade would receive in actual combat.

In many ways, the TSP components for the EXCON roleplayers resemble the components for the subordinate unit roleplayers. Both types of roleplayer guides include information on exercise preparation and conduct, workstation task lists, simulation operating procedures, communication, and scenario background.

In addition, the EXCON roleplayers play a significant role in exercise management. For this reason, their guide includes information that explains mission implementation options, a copy of the scenario timeline, and information regarding how to rehearse the division OPORD brief. All of these items are also contained in the Exercise Guide, and were described above. Materials that are unique to the EXCON workstation, however, are the focus of the following discussion.

Distribution of Tactical Materials

The EXCON roleplayers receive the instructions for distribution of the division OPORD, synchronization matrixes, and INTSUMs. This section includes a table that indicates the tactical materials to be distributed at the OPORD briefings, and the times to distribute each INTSUM and WARNO. At the beginning of each mission, the EXCON roleplayers act as the division staff by briefing the division OPORD and distributing the OPORD, annexes (including overlays), synchronization matrices, and various INTSUMs to the brigade staff.

Prepared Messages

The EXCON materials contain the prepared messages, organized by mission, and indicate when and to whom they should be communicated or distributed, and where they originate (e.g., G2, adjacent brigade). There is one list for the MTC, one for the DATK, and two for the AD. The two AD lists vary slightly at the beginning of the mission. One is used if the AD is conducted as a continuation of the MTC (Options 1 and 2); the other AD list is used if the brigade is starting the exercise with the AD (Options 4 and 5).

Prepared messages help the EXCON roleplayers to provide information and cues to the brigade staff. These messages include both voice and hard-copy messages. The messages supplement the BBS event-based reporting of the supporting and subordinate unit CS and CSS roleplayers by providing division and adjacent unit input to the brigade staff. Most are time-driven, but some are event-driven.

Response Guidelines

Response guidelines answer questions concerning higher and adjacent unit activities and resources. They contain a combination of general and specific information that is directed at responding to expected requests from the brigade staff. This information was considered necessary because the EXCON roleplayers may not be actual division staff, and will not be involved in a real mission. Thus they will not have all of the contextual information that would allow them to respond to questions from the brigade staff that do not relate specifically to the materials provided in the TSP. The response guidelines are designed to assist them in providing realistic and timely responses to brigade staff requests.

The response guidelines were developed through a review of the tactical materials to identify information that the brigade staff may want, but was not included in the tactical materials. The resulting response guidelines were then organized into categories to facilitate timely responses: intelligence, operations (MTC, AD, and DATK), fire support, engineer, air defense, and CSS.

Division and Higher Assets

The EXCON guide also contains a chart that identifies division and other assets, gives their BBS designations, and lists assets controlled by HICON. Because the EXCON roleplayers are responsible for controlling certain division and higher assets, the guide provides this job aid to help them identify those assets, locate them in BBS, and utilize them appropriately so they can coordinate the use of these assets with the system control (HICON) workstation and the brigade staff.

Opposing Forces Controller

In the BSE, the OPFOR workstation simulates the brigade's threat environment by controlling Krasnovian activities using Heavy OPFOR tactics. Krasnovian actions are planned to be consistent with doctrinal publications (as laid out in CAC & Fort Leavenworth PAM 350-16 [DA, 1994]), and supportive of the BSE training objectives. In collaboration with EXCON roleplayers and under the direction of the Exercise Director, the OPFOR Controller manipulates the OPFOR in accordance with the predetermined plan contained in his/her guide. The contents of the guide are described below.

Exercise and Role Overview

The exercise overview includes the Road to War, and describes the general course of the scenario and how the pre-planned OPFOR strategy supports the performance of the brigade staff's training objectives. It was found to be particularly important that the OPFOR Controller and interactors be considered as training participants, so that they clearly understand that their role is to provide cues for brigade staff performance, and not "win" against the brigade.

The OPFOR Controller's role overview includes a workstation diagram similar to that provided to roleplayers and a general description of the duties of the OPFOR Controller and interactors.

OPFOR Storyline and Training Plan

This section describes the Krasnovian campaign plan and tactical situation. It is similar to the 3rd Brigade information provided to the brigade and Blue Forces roleplayers, to provide the context that enables the OPFOR Controller and interactors to behave realistically, consistently, and with doctrinal accuracy.

Mission-Specific Scenario Descriptions

This information is intended to help the OPFOR to remain focused on supporting the training objectives. The information is provided by means of BBS charts and sketches that portray the OPFOR meeting battle, transition from OPFOR meeting battle to attack, OPFOR attack, and OPFOR defense. It points out possible ways to react to various brigade courses of action. The OPFOR was allowed, and even encouraged, to know everything that the brigade was doing, in order to adjust their actions to support the training objectives.

OPFOR Controller Tasks

Finally, the OPFOR guide contains a listing of general and mission-specific tasks, primarily involving coordination with EXCON or the Exercise Director, or use of the simulation. The guide also provides the rules of engagement for the OPFOR Controller and instructions on performing as a member of the White Cell.

Observer Materials

As indicated previously, the BSE requires a team of six observers for the 11 primary training audience members. Their role is to coach the brigade staff, to provide individual feedback, and to contribute to the brigade AARs. The project team anticipated that observers would be drawn from a sister brigade or a local training unit, and would likely have no more tactical experience or observer experience than the brigade staff themselves. They were not likely to be a professional, dedicated O/C team with extensive brigade-level experience.

To assist the observers, the TSP contains as much information as possible to give them the additional edge necessary for serving as observers. The observer guides contain both general and specific information about the exercise and the brigade staff processes, about how to be a coach and observer, and about how to conduct the brigade AARs (primarily for the Senior Observer). Additionally, the task lists described in Section 4 are to be used by observers to cue them to expected brigade staff activities. Finally, the observers receive a complete copy of the division order in advance, so that they can fully assimilate the tactical situation.

The following discussion describes the contents of the observer guides.

Exercise and Role Overview

This section of the observer guides provides a complete preview of how the exercise is to be conducted, and the general duties of observers in coaching and providing feedback. It includes:

- the training objectives and training audience overview,
- a general description of observer duties,
- a description of the training and simulation environment, and
- an overview of the tactical situation.

Observer Preparation

Because the development team felt strongly that observers should have every tool and job aid available, the guide provides detailed suggestions on how to prepare for the exercise. It was believed that, without such guidance, observers might not be sufficiently experienced or expert to interact with the brigade staff as trainers. The materials for observers include guidance on reviewing the tactical materials, reviewing task lists, and participating in the division OPORD briefing rehearsal with EXCON roleplayers.

Activities During the Exercise

This section includes guidance on how to coach and how to provide input for the brigade AAR. This component of observer responsibilities is critical to the training value of the exercise.

The guidance describes the task lists and how to use them, and instructs observers on the type of information to collect for use in the AARs.

Senior Observer Responsibilities

These responsibilities include directing observers in preparation and during the exercise, performing tasks within the White Cell, and preparing for and conducting AARs. The guide also includes AAR slides and notes on important points to stress in the AARs.

Brigade/Battalion Battle Simulation Workstation Interactor Materials

At each Blue Forces workstation and at EXCON, there are usually three interactors, one each for combat, CS, and CSS. Red Forces workstations have only two interactors each (no CSS). Each of these interactors works at a dedicated terminal for his/her function at the workstation. There are three interactor guides that facilitate the interactor processes: a "Blue Interactor Guide," a "HICON/EXCON Interactor Guide," and a "Red Interactor Guide."

The interactor guides are not intended to provide complete information on BBS operations. Rather, it is expected that the simulation site staff will provide initial training on using BBS equipment and controls in advance of the exercise itself. Exercise-specific training and the guides then provide details on how to use BBS to support the BSE mission.

The materials contained in the interactor guides are described below.

General Informational Materials

The TSP materials for interactors include numerous components to be reviewed prior to the conduct of the BSE. These materials relate to the operation of BBS and include the following:

- rules of engagement,
- unit naming conventions,
- unit OPSTATE worksheets,
- CSS roll-up reports,
- BBS pull-down-menu charts, and
- addendums to the BBS 4.0 Warfighter's Guide (NSC et al., 1994).

Rules of engagement. The rules of engagement materials serve two functions and are segmented into two parts: general rules of engagement and boneyarding rules of engagement. The general rules of engagement list the operational constraints that apply to interactors. These represent the more basic rules in order to help interactors focus on support of the training objectives. Examples of these rules include: keep roleplayers informed, know the BBS icons, and verify icon groups. The boneyarding rules of engagement, alternatively, describe the methods by which the HICON workstation eliminates certain icons based on criteria of combat effectiveness. These boneyarding workarounds are required in order to maintain the repair flow on damaged vehicles and the evacuation rates on casualties.

Unit naming conventions. The unit naming conventions describe the COBRAS method for helping interactors keep track of the icons that are created during the exercise. For instance,

over time, the number of split-out icons will increase as sets of trucks are required for resupply, groups of ambulances are needed to evacuate casualties, and wreckers are sent on recovery missions. The rules present a systematic method for naming newly created icons so that they can be later identified and placed back into the unit from which they originated.

OPSTATE worksheets. The unit OPSTATE worksheets contain concise portrayals of the portion of the BBS 4.0 Warfighter's Guide (NSC et al., 1994) that contains information describing the available BBS OPSTATEs. The worksheets are intended as introductory materials for interactors as well as job aids to be posted at workstations during the exercise.

CSS roll-up reports. The CSS roll-up report components consist of two tables, both identifying the relationship between BBS report purposes and formats, and tactical report purposes and formats. Two tables were created to facilitate usage. The first table is organized by class of supply to help interactors identify the BBS reports to generate depending on the type of information requested by the roleplayers. The second table is organized by BBS report name to help interactors identify the types of information that will be generated in each type of BBS report. These tables serve as introductory materials and as job aids to use during the exercise.

BBS pull-down menus. The BBS pull-down menu charts represent pictures of the BBS menu screens. The charts were reproduced from the BBS 4.0 Warfighter's Guide (NSC et al., 1994) and were included in the interactor guides to provide general assistance to interactors who may be non-experts at BBS operation. The charts were deemed necessary because the COBRAS staff had witnessed that some BBS sites did not provide warfighter's guides to all interactors participating in exercises.

Warfighter's Guide addendums. The addendums to the BBS 4.0 Warfighter's Guide (NSC et al., 1994) provide specific mission instruction as a supplement to the procedural information found in the BBS 4.0 Warfighter's Guide. In some cases, the addendums link a number of procedural instructions to facilitate the conduct of procedures that require the performance of several BBS tasks. The instructions and functions contained in the addendums were found to be necessary for interactors, but were not provided in the Warfighter's Guide.

Force Description Materials

In addition to the materials listed above, the TSP includes two components that introduce the interactors to their workstations. Specifically, these components address the forces located on the workstations. They include the exercise forces directories and initial unit workstation assignments.

The exercise forces directories are organized according to force-type: blue and red. Each provides a comprehensive listing of all forces involved in the exercise. Details include the short name (i.e., the BBS screen name) for the icon, the long name (i.e., the name by which the entity is identified in the scenario), the standard symbol for the unit type and size, the primary line of equipment or weapon, the secondary lines of equipment, and the personnel assigned to each unit.

The initial unit workstation assignments products are also organized by force-type. They identify the forces at each workstation through depicting task organizations and composition by mission. Together, the forces directories and initial unit workstation assignments products can be used to verify that the units on the workstations are correct for the exercise (given that the exercise uses the task organizations indicated in the products).

Initialization Checklists and Instructions

There are unique BBS initialization checklists for each type of workstation:

- combat, CS, and CSS workstations; by
- offense and defense; by
- supporting/subordinate units, HICON/EXCON, and OPFOR workstations (no CSS).

While they are titled and formatted differently, the checklists and instructions serve the same functions: to assist in workstation preparation and table of organization and equipment (TOE) familiarization. The need for the instruction provided by these components was realized during the earliest COBRAS-internal BBS pilots of the BSE. Personnel serving as interactors recognized the need to perform certain tasks (e.g., verify supply lists, set medical collection points, and set target priorities) during the timeframe when the brigade staff was conducting planning operations, and other tasks (e.g., build CSS roll-up reports, split out units, and create ambulance exchange points) while the unit roleplayers were preparing the subordinate and supporting unit OPORDs. After executing the initialization guidance contained in these materials, each workstation is prepared for the execute phase of the exercise in which workstation personnel perform the missions developed during the brigade's planning and preparation processes.

Execution Material for Red Interactors

During the execution phase of the BSE, the blue forces are maneuvered according to the plans laid out during the planning and preparation phases. Red forces, on the other hand, are pre-determined due to the structured nature of the exercise. To help red interactors control the enemy force, the "Red Interactor Guide" contains a Red Movements Matrix. The matrix is organized according to the three BSE missions and depicts the pre-planned enemy movement leg, start time, and OPSTATEs. The matrix is intended as a job aid to be used during execution.

Simulation Site Staff Materials

The role of the simulation site staff in the BSE is primarily preparatory in nature: configuring the simulation, entering the appropriate exercise data into the simulation before the exercise, and training interactors. During the exercise, the site staff is responsible for assisting interactors and resolving problems with the simulation itself.

In addition to the simulation tapes for the exercise, the BSE TSP contains detailed information regarding these two areas of responsibility. This information, which is intended for the BBS site manager, is contained in two guides: the "BBS TOE and Initialization Book" and the "BBS Archive Book." Additional information is also contained in the interactor guide materials.

Information pertaining to the TOE for the exercise is provided primarily through the electronic tapes for each mission. These initialization tapes load a task organization into BBS on the appropriate workstations and initialize all forces at 100% strength. Archive tapes then are used to decrement supply, equipment, and personnel assets to match the specifications of the scenario.

The development of the simulation preparation materials and instruction occurred throughout the project. The TOE/initialization and archive tape content was manipulated

continually according to the design of the scenario. For each pilot exercise, the information was used, evaluated, and then later adjusted according to the scenario changes that resulted from the pilot. The final product represents a consolidation of the final scenario specifications as well as knowledge gained about the processes required to input the information into the simulation.

The processes covered under simulation site preparation and operation for the BSE, from both BBS guides and the appropriate section of the interactor materials, are described below.

BBS TOE & Initialization Book

This guide includes two types of items:

- MTOE for the exercise. The MTOE indicates the authorized equipment and personnel designed for the exercise for division and brigade forces, as well as the actual levels built into the BBS files and assigned to units. These lists were provided in two forms: One is a more standard MTOE presentation, which should be familiar to military participants (sections of this list were also provided to roleplayers and primary training audience members). The second list is arranged to be usable by BBS site personnel who might need to modify the initialized levels or assignments.
- BBS initialization worksheets. For every unit in the simulation, these worksheets provide the unit icon names (short and long), starting grid location, workstation assignment, starting strength (%), TOE name, unit type, and unit symbol.

BBS Archive Book

The archive book contains instructions on how to load archive tapes and verify archive information.

To facilitate the play of CSS operations, each mission of the BSE was designed to begin with the training brigade at less than full strength. Loading the archive information into BBS sets up the simulation under these decremented conditions. For each mission, five archive tapes are provided. These tapes are used to input supplies, parts, equipment shortages, personnel vacancies and wounded, maintenance losses and initial graphic control measures, and to redistribute forces to their starting locations.

Some latitude to adjust the task organization does exist, and it is up to the brigade to inform the BBS site staff of these changes. Once the archive information has been loaded, the BBS site staff should adjust the TOE according to the TOE the brigade plans to use during the exercise. There are no job aids or listings in the TSP designed to facilitate this process, as the specific TOEs to be employed vary according to the individual training brigades.

The last step in preparing the simulation for the exercise is to create archives of the files after they have been modified as necessary for a brigade's use. Immediately before the exercise, the site staff is to load these archive files, which will prepare the simulation for implementation. Guidance on this subject, as it is for each of the simulation preparation steps, is intended only to communicate the steps that are necessary before any BSE implementation.

Workstations Assignment Information

This guidance informs the simulation site manager about the workstation configuration that is required by the BSE, and more specifically, by each implementation option. The

information includes an explanation of the number of BBS workstations are required by the BSE, and which force elements (e.g., battalion TFs) should be allocated to each workstation.

Graphic Control Measure Information

This information includes point-to-point grid locations for each graphic control measure (GCM) provided in the BBS initialization tapes, as well as worksheets that the brigade can use to designate additional GCMs before the exercise.

Interactor/Roleplayer Training

The training outline and slides provided are to be used to supplement any standard BBS training that the simulation site normally provides to interactors. The training is focused on the functions and responsibilities that will be required in the BSE.

Summary

This section has summarized the quality assurance review that occurred after the pilot test, in preparation for a trial implementation. It also gave a complete description of the BSE planning, preparation, and implementation process; presented a portrayal of the exercise participants and the workstation assignments; and detailed the contents of the TSP. In providing the description, the section includes information pertaining to considerations that affected component organization and contents, indications of how the TSP materials were intended to be used, and formative evaluation activities during initial development for TSP components.

The TSP materials, as described in this section, were provided to ARI as a final deliverable in May 1996. The trial implementation was scheduled for August 1996, after the project conclusion. Therefore, ARI took delivery of the TSP with the understanding that trial implementation findings would be used in the already-ongoing COBRAS II work (described in Section 11).

The following section describes the final major evaluation activity for the BSE materials, the trial implementation.

SECTION 7: TRIAL IMPLEMENTATION OF THE BRIGADE STAFF EXERCISE

This section covers the key formative evaluation findings from the trial implementation. The section first presents the evaluation objectives, and also documents constraints that limited the scope of the evaluation. The evaluation findings represent both feedback provided by participating unit members and observations made by COBRAS staff members, and provide a comprehensive summary portrayal of the data collected.

Analysis of the trial findings consisted of content analyses of comments and nonparametric data summaries (percentage reports). Highly powerful statistical analyses were deemed inappropriate because of the small sample sizes and the large number of moderating variables that could influence the data. The content analyses of the data enabled developers to extract useful information from the results, without making unsupported inferences.

Brigade Staff Exercise Trial Implementation Plan

The external trial of the BSE was conducted in August 1996 with the 1st Brigade, 1st Infantry Division (Mechanized), at Fort Riley. This group represented the intended training audience and participants, a conventional AC brigade.

The principal focus of the trial was to verify the TSP exportability; other evaluation objectives were directed at verification of the modifications made as a result of the pilot test and internal review. The trial involved the COBRAS staff in a hands-off observation of the planning, preparation, and actual conduct of the exercise. At the same time, the COBRAS staff were prepared to assist if necessary, so that the trial implementation would provide solid training for the participating brigade.

As described earlier, the trial took place after the TSP had already been provided to ARI as a deliverable. The information collected by means of observations and discussions with participants would not be used to revise that deliverable, but rather to guide the ongoing development for the COBRAS II expansion to the BSE.

The discussion below details the trial implementation results regarding the quality of the BSE as it existed at the conclusion of the COBRAS project.

Objectives

In addition to providing a case study of whether or not the BSE could be implemented by an AC brigade, the trial offered an opportunity to assess other, more specific aspects of the program. These areas of assessment were primarily a matter of verification of decisions and revisions made after the pilot test and the internal review, and include the following:

- to evaluate the flexibility of the training program under specific implementation conditions (described below),
- to verify the BBS training plan for interactors and roleplayers,
- to verify the content and organization of the TSP,
- to verify the scenario tactical materials,
- to verify the staffing specifications and participant workloads,

- to verify the scenario realism,
- to verify the amount and realism of CSS activity, and
- to evaluate the extent to which the training benefited participants.

Conditions

During the trial implementation, there were several significant departures from the implementation model contained in the TSP. These included the following:

- The unit employed three TFs, rather than the four called for in the scenario. This configuration matched the brigade's actual organization. The change required exercise managers to modify the division order, brigade sector of operations, and other tactical materials.
- The brigade commander decided to use an accelerated tactical decision-making process, rather than the DDMP as was written into the MTC mission. The time saved from the planning process was given to the subordinate units for their own planning. Overall, the change did not require any modifications to the scenario storyline represented by the division and OPFOR activities and BBS-represented events. However, the exercise schedule required significant adjustment.
- The division OPORD was not briefed to the brigade staff as the exercise's initiating event, but instead was simply given to them. While this allowed the brigade an additional hour or so in planning, it also precluded the opportunity for the Exercise Director or EXCON roleplayers to represent more precisely the division commander's guidance and intent to the brigade.
- Although the brigade primary staff participated in the full exercise, other training audience members were less involved. The brigade commander allowed the XO and S3 to direct most of the planning activities, joining in the exercise to receive updates and briefings, and participating fully during the rehearsal and mission execution. Others, including the FSCOORD, ADCOORD, brigade engineer, and FSB commander, did not participate until well after planning was completed. Likewise, battalion TF staff were only minimally represented before the rehearsal and execution.
- The Exercise Director was not a full time manager during the exercise preparation and conduct, although he was always in the area and available for decision-making. For the most part, exercise direction was provided under his monitoring by the COBRAS Coordinator; the simulation staff managed all of the simulation-related matters, including interactor and roleplayer activities; and the Senior Observer directed all of the observation and AAR functions. The Exercise Director did participate in all White Cell meetings and attended all AARs.
- The COBRAS model anticipates that the observers will be peers of the training audience, with comparable levels of experience and expertise. For the trial, several of the observers were of lower rank than the brigade personnel that they worked with, and two of the observers were relatively naive with respect to the subject matter.
- The simulation site staff elected to conduct their own BBS pre-exercise training, rather than using the interactor and roleplayer training program described in the TSP.

Trial Implementation Results

The trial did not reveal any fatal flaws in the BSE architecture, implementation design, or TSP components, although the departures from the implementation model made it difficult to assess several aspects of the TSP. There was a great deal of information gathered and feedback from participants, most indicating areas that could be improved in the development of future programs.

The results of the trial are presented according to the trial objectives, listed above. They include summaries of information gathered by means of interviews, questionnaires, post-exercise group sessions, and direct observation of the implementation. As described in Section 3, there were essentially two types of items on the questionnaires: statements with Likert-type 5-point scale response options (where 5 indicated the most positive response [e.g., strongly agree, very well], and 1 indicated the least positive response [e.g., strongly disagree, not at all well]); and open-ended items where respondents were to answer a question (e.g., what additional instructions should there be in the BBS initialization procedures).

When questionnaire data summaries are provided, they include the item focus (a short phrasing of the item's content), type and number of respondents, distribution of responses, and any additional comments made by respondents. Response distributions are presented as the percentage that were positive (response of 5 or 4, indicated by "P") and the percentage that were negative (2 or 1, indicated by "N"). Note that in some cases, particularly with observers, the number of respondents was six or less, and the data should be interpreted with great caution as general indications of trend only.

Training Program Flexibility

The COBRAS team observations revealed that the program is relatively flexible in certain aspects of implementation, and less flexible in others. Focusing on the departures from the implementation model described above, COBRAS staff members watched for effects in three criterion areas:

- the tactical quality of the scenario,
- the utility of the TSP to support the exercise, and
- the smooth functioning of the implementation.

The decision to alter the exercise brigade force structure was made by the brigade commander, and the exercise managers were responsible for ensuring that the entire set of tactical materials was examined and modified as necessary to ensure consistency. Working with the simulation center staff, the designated COBRAS Coordinator worked through the TSP to make all of the needed changes. As a result, there were few (if any) disconnecting elements of the tactical materials. The altered storyline was plausible and acceptable to the brigade, and the BBS components were in concert with the printed tactical components. Although the change caused more front end work than would otherwise have been required, it did not compromise the exercise conduct on any of the three criteria.

The next four conditions described above (the accelerated decision-making process, the omission of the division OPORD briefing, and the less-than-full involvement by many of the roleplayers and training audience members, and by the Exercise Director) had a compounding

effect on the quality of the exercise. Any of the four conditions alone might not have been a significant source of difficulty, but together they led to frustration and wasted effort. The COBRAS staff observed that on three of the five exercise days, the brigade staff worked into the evening and very early in the morning to make up for false starts in their brigade planning and order preparation. When brigade special staff and battalion primary staff members joined the exercise-in-progress, they required some time for orientation and updating. However, their staffs and other unit representatives had, for the most part, anticipated their intents and planned accordingly.

The observers' lack of direct experience, expertise, and rank-associated credibility seemed to have little effect on the quality or smoothness of the training. The observers came from an RC training cadre, and although they had less staff experience than requested, all had prior observer experience. While it is impossible to anticipate how the brigade-observer interactions would have occurred if observers had comparable levels of brigade staff experience, at least no friction or dismissal was observed. Because the simulation site staff had a BBS familiarization course to use, the COBRAS materials for interactors were introduced in a very sketchy fashion. Much confusion could have been avoided by their use. Developers realized a need to design COBRAS familiarization materials that will be acceptable to and used by site staff.

In summary, the departures from the model in terms of the scenario had minimal effect on the training quality, largely because of the diligence of the COBRAS Coordinator and the simulation site manager and staff. The other changes, however, which all concerned roles and responsibilities, appeared to cause more difficulties than might otherwise have occurred. The conundrum for COBRAS developers, therefore, was whether to continue to lay out high expectations for personnel experience and involvement; or to re-evaluate the requirement against real-world capabilities to satisfy the expectation. The decision was made to continue to require highly experienced personnel, and to require that they participate fully, in order to ensure that all of the essential components of the training could be provided.

Brigade/Battalion Battle Simulation Training Plan for Interactors and Roleplayers

As a result of the first external pilot of the BSE, the COBRAS team had made a stronger and more detailed recommendation for pre-exercise BBS training, although they did not provide a specific program for its conduct. During the trial, the simulation site staff conducted their own BBS training program, and the roleplayers and interactors conducted a mini-exercise to rehearse the mission and to practice working with each other; the COBRAS training was not used. The evaluation focused on training effectiveness and the need for BBS training. Participant feedback is summarized in Figure 23.

Item Focus	Respondents (n)	Response Distribution	Comments
How well the BBS training prepared them for the exercise	Roleplayers (19)	P = 47% N = 26%	OK as it is Need more, like 72 hours
	Interactors (27)	P = 44% N = 22%	Need more than one day of exercise practice
	Overall (46)	P = 67% N = 24%	
Whether BBS training was necessary for their role	Roleplayers (26)	P = 62% N = 8%	Need training on: • general BBS capabilities • creating routes • moving vehicles • splitting units • interpreting BBS reports • processing fire missions • translating plans into BBS environment • tracking the battle in the simulation

Figure 23. Summary of roleplayer and interactor responses concerning utility of the Brigade/Battalion Battle Simulation pre-exercise training.

The responses suggested that the training was perceived as relatively effective and necessary. Additionally, the COBRAS team observations indicated that the quality of any BBS training could be highly dependent upon the simulation site staff and the level of resources they are able to contribute to such training, and that it was more prudent to take the risk of being too specific in the guidance. As a result, the TSP guidance to provide BBS training for interactors and roleplayers was retained.

Training Support Package Component Evaluation

The final version of the BSE TSP provided participant guides, division OPORDs and other tactical materials, job aids, brigade staff task lists, and performance observation and feedback materials. During the trial, the evaluation effort focused on determining the extent to which each of these components facilitated implementation of the training. The specific components of the TSP include:

- general instructions,
- description of the training purpose,
- instructions for training audience preparation,
- organization of the guide,
- information on participant roles,
- roleplayer task lists,

- BBS workarounds,
- brigade staff task lists for observers, and
- observer materials for AARs.

In the questionnaires, participants were presented with one or more items that asked them to rate each of the above components. The results of these and other open-ended questionnaire items, plus verbal feedback from participants and COBRAS team observations are discussed below.

General Instructions

Each participant guide included instruction regarding every aspect of participation in the exercise. One aspect of the evaluation of this instruction focused on the clarity of the instruction. The results are shown in Figure 24.

Responses to the questionnaire item indicated that the instructions were generally clear. After the pilot, the COBRAS team had revised the roleplayer and interactor guide so that less reading was required. The trial participant comments indicate that it may not be possible to reduce the amount of reading required to prepare for a structured training exercise. By nature, a structured training program must use some type of media to inform participants about their roles, responsibilities, and specific tasks in the exercise. Multimedia presentations may be a solution that could be investigated in future development efforts.

Item Focus	Respondents (n)	Response Distribution	Comments
Clarity of instruction in the participant's guide	Roleplayers (25)	P = 52% N = 8%	Too wordy.
	Interactors (26)	P = 65% N = 4%	
	Observers (5)	P = 80% N = 20%	Told us more than we needed.
	Training audience (10)	P = 70% N = 10%	Clear, but need to be more concise.
	Overall (66)	P = 62% N = 8%	

Figure 24. Summary of responses concerning clarity of instructions in the roleplayer, interactor, observer, and training audience guides.

Description of the Training Purpose

Understanding the concept and purpose of the BSE is key for the target training audience. Thus, the training audience guides included information on purpose and objectives of the training. The questionnaire for the training audience members included one item on how well the training audience guide conveyed the training intent.

Responses to the questionnaire item were likely influenced by the fact that some brigade staff personnel reported that they did not spend much time reading their guides (between one hour and four hours). Nevertheless, 50% of the target training audience (five of the respondents) reported that the guide helped them understand the objectives of the training. Another 30% (three respondents) reported that the guide provided little or no help in this matter. Other comments indicated that the guide should have better explained the training objectives, and that it "...needs to be as direct, simple, and straightforward as possible."

Instructions for Training Audience Preparation

The training audience guides provided little specific instructions regarding exercise preparation other than a study of the guide, review of references and the task lists, and strong recommendation that they become familiar with the tactical materials that were distributed before the exercise (primarily the ISPs). One item on the training audience questionnaires focused on the capability of the guide to help them prepare for the exercise.

Brigade staff responses were divided. Some (40%, or four respondents) reported that the guidance on preparation was sufficient, while 40% reported that the guidance was not sufficient. From observation and discussions, however, the COBRAS team concluded that most of the brigade staff appeared to be as prepared for the exercise as had been expected, and those who were not had not spent much time with their guide or tactical materials prior to execution.

Organization of the Guides

The BSE guides for roleplayers and interactors contain a number of sections and job aids that address different performance aspects of the exercise. It was important, then, to evaluate the extent to which the organization of the guides facilitated finding information on different topics. The results are shown in Figure 25.

Item Focus	Respondents (n)	Response Distribution	Comments
Ability to find information in guides	Roleplayers (26)	P = 54% N = 23%	Add index.
	Interactors (28)	P = 54% N = 7%	Provide guides to all interactors, rather than one per workstation.
	Overall (54)	P = 54% N = 15%	

Figure 25. Summary of responses concerning ease of finding information in the roleplayer and interactor guides.

In general, responses were positive. Although neither roleplayers nor interactors used their guides as much as the COBRAS staff had hoped they would, there were at least no reasons intrinsic to the guides to prevent their use. In planning the guide organization for the COBRAS II exercise, the overall outline would not change radically, although the table of contents design would be examined to see if it could be made more useful. The response to the earlier items, that the guides should be concise and to the point, suggested that brevity, a logical organization, and pointers to content areas would together result in useful guides.

During the trial implementation, it was observed that the organization of the interactor guides was extremely cumbersome, to the point where the materials were not widely available or used. Therefore, the materials would be (in the expansion project) reorganized into a total of eight distinct interactor guides, including: combat, CS, and CSS guides for Blue Forces and EXCON workstations; and combat and CS guides for the Red Forces workstations.

Additionally, all of the simulation site materials were flagged for reorganization into three books, so that the site staff could more easily find the needed information. Additional instructional guidance was also to be prepared, to supplement the lists found in the interactor guides.

Participant Role Information

Descriptions of participant roles and responsibilities were included in each participant guide. The evaluation included three questionnaire items on the effectiveness of this information for roleplayers, the OPFOR Controller, and interactors. The responses are shown in Figure 26.

Item Focus	Respondents (n)	Response Distribution	Comments
How well the guide explained their role	Roleplayers (24)	P = 46% N = 21%	
	Interactors (25)	P = 48% N = 16%	Could explain everyone's role more clearly.
	Observers (5)	P = 80% N = 20%	Guide was too standard, from my experience.
	Overall (54)	P = 50% N = 19%	
How well the guide helped them perform their role	Roleplayers (25)	P = 48% N = 16%	Helps the roleplayer respond to various situations. Very helpful.
	Interactors (26)	P = 50% N = 12%	Directions too generic for some actions
	Overall (51)	P = 49% N = 14%	
How well the guide explained purpose -- to support brigade staff training	Roleplayers (27)	P = 85% N = 4%	
	Interactors (28)	P = 68% N = 11%	
	Observers (5)	P = 80% N = 0%	Purpose - support preparation for NTC. Purpose - evaluation of program components for the Army.
	Overall (60)	P = 77% N = 7%	

Figure 26. Summary of responses concerning description of roles and the purpose of the training in the roleplayer, interactor, observer, and training audience guides.

Thus, most participants indicated that the guides helped them understand and perform their roles in the training. None of the responses or comments pointed to a need for drastic revisions. In future versions, however, the roles of all participants would be more clearly described.

Roleplayer Task Lists

Roleplayer task lists were designed to facilitate the interactions between the roleplayers and interactors in accomplishing unit operations. They contain the tasks the roleplayers must perform, explain them in terms of BBS functions, and identify the interactor (combat, CS, or CSS) who must assist in performing the task. One questionnaire item focused on the utility of the roleplayer task lists in helping them perform their duties within the context of the simulation-based exercise.

Overall, the responses were positive, with 59% of the respondents (13 out of 22) indicating that the task lists were helpful, and only 18% (four respondents) indicating that the task lists were not helpful. Comments ranged from "Perhaps the most valuable aid in executing your duties as a roleplayer," to "be more specific." The overall substance of the comments was that the task lists were well constructed, easy to use, and useful to training participants.

BBS Workarounds

After the first external pilot of the BSE, the BBS workaround instructions were revised so that they more clearly explained why and how functions that cannot be replicated realistically in the simulation should be performed to emulate the battlefield. Roleplayers must understand how these functions are performed in BBS to enable them to perform their duties in controlling the unit operations. One questionnaire item for interactors focused on the clarity of the instruction.

The responses were very positive, with 71% of the respondents (12 of 17 respondents) reporting that the instruction was clear and no respondents indicating that the instructions were unclear. COBRAS developers who observed the trial and roleplayer comments indicated most roleplayers used the BBS workaround instructions. No problems in the correctness of the workarounds, nor in the ability to use them, were observed or reported.

Brigade Staff Task Lists for Observers

The brigade staff task lists were used by observers to monitor and coach the brigade staff performance. One questionnaire item focused on the utility of the task lists in facilitating these observer duties.

Observer reaction to the brigade staff task lists was essentially noncommittal. Four of the five respondents indicated that the task lists were neither helpful nor unhelpful. Only one of five observers said that the task lists were not useful at all. The observers did, however, suggest several improvements, as described in the following comments:

- Make task list objective-based, not detail-based. Use details as ways to achieve the objective. I did not use task list to assess.
- More detail in the AAR task lists. Key tasks to references. This will allow an observer to read the appropriate doctrinal sources for self-study/preparation. [Add a] column to left of each task reflecting subtasks of the major elements of the decision making process.
- On wargaming -- Engineer portion needs tasks added [from] FM 5-71-3 (DA, 1995) [on] input to synchronization matrix, identifying critical events/decision points,

wargaming timing, aspects of situational obstacles, observation/suppression for combined arms breach, class IV/V for current/future operations.

- The task lists are a good start. However, the observer must still assess how well the tasks are accomplished. Integration of a standard for key tasks would be very useful.
- Perhaps the check list could have contained more detail concerning requirements for FSO [and] FSCOORD in orders prep. What should the order contain—doctrinally: Was high payoff target list included—did it support maneuver/concept of operation? Did fire support plan consider refuel and ammo resupply plans? Did fire support annex discuss and illustrate employment of CAS? Were priority intelligence requirements, high payoff target (HPT), NAIs linked?

In general, the observers commended the task list work, but felt that much improvement was still possible. The emphasis was on more concise task lists with back-up detailing and standards (where appropriate). As a result, the task lists were flagged for significant reexamination during the expansion work on COBRAS II.

Observer Materials for AARs

Observer materials included Summary Sheets, which help observers consolidate observations for the Senior Observer to use in AAR preparation; slides to use during AAR presentation; and general instruction regarding the performance observation and AAR processes. Again, the evaluation focused on utility of the materials.

Results from the questionnaire indicated that two of the observers did not find the materials helpful, while three were neutral on the subject. Subsequent queries of the observers indicated that the task lists were cumbersome for carrying around during the exercise. Several observers reported that they had initially come back to the task lists periodically to record their comments, but eventually used the task lists primarily to prepare themselves for the exercise segment and wrote their comments on 3" x 5" cards or paper.

COBRAS developers reported that some observers used the materials and others did not. In particular, the Summary Sheets were rarely used. Generally, the Senior Observer did not use the task lists, but his AAR discussion indicated that he probably did refer to the AAR suggestions in the guide, and the TSP slides were used in the AARs. Given the lack of a full test of the materials, the COBRAS staff had little indication of what might be more useful. Nonetheless, the observer materials were also flagged for close reexamination.

Scenario Tactical Materials Evaluation

As stated earlier, there were several conditions that affected the evaluation of the scenario in terms of event play-out. Scenario-related TSP components (i.e., ISPs and the division OPORD), however, did lend themselves to questionnaire coverage.

The BSE TSP included ISPs for subordinate and supporting unit roleplayers and members of the target training audience. The ISPs contained materials to orient participants to the tactical situation. They were important because the training participants are introduced to a mission without knowing the tactical context or having experienced background events. The ISP was used with the division OPORD by the training audience during their planning and preparation process.

Three questionnaire items focused on the tactical materials. All three were addressed to the training audience, while the roleplayers were asked only one of the three questions. The results are summarized in Figure 27.

Item Focus	Respondents (n)	Response Distribution	Comments
How well the ISP provided information needed	Roleplayers (12)	P = 42% N = 17%	Did not use materials. No improvement necessary. No information about the S2.
	Training audience (10)	P = 20% N = 30%	Overlays did not match each other for the BOS elements. Obstacle overlay should have had zone extended throughout the sector or should have been easily changed. Need specific situation information to focus the brigade. The initial situation is very general—almost something you'd read in the newspaper. Don't see how it could really be improved. It was a good document. However, in all honesty, I spent very little time reviewing because my job absorbs all my time. Materials need to be relooked to fit brigade operations—seemed to be addressed at division-level. Real confusing—too broad—break down to 1:50,000—ensure we have the map capability to support mission. Replace verbiage with tables and charts. For commander, XO, and S3, include an initial executive overview. Better intelligence package.
	Overall (22)	P = 32% N = 23%	

Continued on next page

Figure 27. Summary of responses concerning description of roles and the purpose of the training in the roleplayer, interactor, observer, and training audience guides.

Item Focus	Respondents (n)	Response Distribution	Comments
How well the OPORD defined the METT-T	Training audience (9)	P = 44% N = 22%	Engineer annex poor. No obstacle intent, no discussion of last phase of the battle which should have or could have extensive engineer effort. Normally would receive engineer brigade OPORD. OPORD is too "vanilla" – looks like a standard CGSC OPORD. Needs to be more detailed when addressing DIVARTY assets available including Q37 and MLRS positioned in the brigade zone. Intel a bit vague. Too vague, too much information not broken down into pertinent information. Availability of air assets for CAS. Availability of NBC augmentation for BSA. Breakdown of replacements by MOS.
Usefulness of OPORD in preparing the brigade plan	Training audience (8)	P = 50% N = 38%	Division order is very vanilla – be force-oriented, go and get the enemy, etc. . . Division target list [is a] laundry list of road junctions, terrain features throughout the sector for the brigade fight, with no task or purpose. Order needs to be focused and specific in all respects. Forward detachment for enemy forces is not addressed at all in the order—it changes the nature and timing of the fight. Need flexibility to change.

Figure 27 (continued). Summary of responses concerning description of roles and the purpose of the training in the roleplayer, interactor, observer, and training audience guides.

Upon review after the trial, none of these comments were judged as necessitating revisions in the content of the ISPs. That is, the areas of concern did not affect the TSPs capability to support the training exercise; rather the concerns represented extra improvements that could be made to the ISPs. The COBRAS team did not observe that any of these concerns had a negative impact on the training during the trial.

Staffing Specifications and Participant Workloads

Another focus of the trial was on the feasibility of workload requirements for the roleplayers (including the OPFOR Controller), interactors, and observers. The purpose was to ensure that the TSP recommended appropriate numbers of training support personnel. Results, for all three groups of participants, are shown in Figure 28.

Item Focus	Respondents (n)	Response Distribution	Comments
Ability to keep up with workload	Roleplayers (28)	P = 79% N = 7%	
	Interactors (26)	P = 89% N = 0%	
	Observers (5)	P = 100% N = 0%	Senior Observer should also work with XO and with whoever is in the TAC during execution.
	Overall (59)	P = 85% N = 3%	

Figure 28. Summary of responses concerning workload requirements for roleplayers, interactors, and observers.

During the trial, the unit used more than the recommended numbers of brigade personnel in the main, rear, and TAC CPs. Thus, the evaluation of this issue was somewhat less than clear-cut. Results indicated, however, that workload was not a problem; only two persons, both roleplayers, reported that they had any difficulty in keeping up with their workload. Given this result, along with the fact that the recommended participant numbers were not tested, the COBRAS team saw no indication that the participant number specifications should be modified.

Scenario Tactical Realism

The BSE is intended to focus on the performance of brigade staff processes in a realistic tactical environment. One questionnaire item addressed the extent to which the BSE provided an realistic setting, asking the primary training audience and the brigade staff assistants the extent to which the exercise felt like an actual mission. The results are shown in Figure 29.

Item Focus	Respondents (n)	Response Distribution	Comments
How much exercise felt like actual mission	Training Audience (9)	P = 33% N = 22%	Simulation can't be like being in the field.
	Brigade staff assistants (16)	P = 56% N = 31%	
	Overall (25)	P = 48% N = 28%	

Figure 29. Summary of responses concerning tactical realism of the exercise.

Overall, the responses were positive. Given the responses and the non-consequential nature of the comment, no revisions were made to the program's architecture in response to the findings.

Amount and Realism of Combat Service Support Play

The majority of the CSS play in the BSE was designed to occur at the early stages of the three missions, and during the transition between the MTC and AD missions. The primary training audience was asked to compare the amount and realism of CSS play in this exercise to previous training exercises. Some of the comments included:

- "MTC is a tough mission to make the BOS synchronize—engineer effort is primary to mobility but enemy didn't develop the situation [require utilization of] engineers."
- "CSS play is work. Resupply is too easy, which allows us to 'hand wave' CSS planning and then 'magic' it during the game. There are also software limitations that prevent me from doing what I would do in a real fight. For instance, I couldn't modify my ammo load with my monitors as much as I would have liked."
- "About the same as other simulators."
- "About the same [as] for [other] BBS/constructive exercises, less than Janus and live simulations."
- "Pretty good amount as compared to prior BBS [exercises]."
- "Definitely more CSS. Surprised the support operations officer cell. Better definition of division support needed."
- "Did not observe any CSS play in the exercise."

During the trial, the unit stopped short of conducting consolidate and reorganize operations, thus decreasing the exercise's capability to drive CSS play. Given this, the exercise was quite highly perceived in terms of its capability to provide CSS play opportunity.

Training Benefit

The final topic of the evaluation focused on the extent to which the training provided a valuable experience for the participants, primarily to the brigade staff, but to others as well. Participant feedback was the prime source of this information. Thus, four questionnaire items were designed to cover the following topics:

- knowledge acquisition,
- skill improvement,
- performance improvement within the brigade staff, and
- training value to supporting participants.

The results are shown in Figure 30.

Item Focus	Respondents (n)	Response Distribution	Comments
Increase in knowledge needed to perform job	Training audience (10)	P = 50% N = 20%	Been in job—about a month—used the exercise to review the general organization and flow of information between the brigade tactical operations center (TOC) and the engineer TOC. My focus was on developing an understanding of the current system in place. I've been the FSCOORD/Artillery battalion commander for 13 months, which includes 3 BBS exercises, numerous orders development drills, and an NTC rotation. I honestly don't feel I learned much at all involving my role. Did not learn anything new (technically) but was a good review of planning issues. What to check, ask for, insure happened, etc... Increase in proficiency/practice of skills already in place. No advancement of skills/TTP beyond those already in hand. The question is purpose to practice skills or train new skills. The orders process—[there is] difficulty understanding the initial products which drive the train (INTEL). When to provide personnel estimate to commander. Relationship to other 'players' in the brigade rear. Very little. This is the first time I've worked as an FSO and the first time I worked with this unit. I learned a lot as to what I need to do to prepare for my role and how to execute it. However, I could have learned this from any BBS type exercise.
	Brigade staff assistants (18)	P = 61% N = 22%	Learned a lot about how to perform roles. Learned about the larger staff process.
	Overall (28)	P = 57% N = 21%	

Continued on next page

Figure 30. Summary of responses concerning training benefits.

Item Focus	Respondents (n)	Response Distribution	Comments
Improve skills that would be used in battle	Training audience (10)	P = 60% N = 0%	Tracking the battle Developing the inputs and outputs for the brigade plan Time management skills Communication skills in directing staff operations functions Producing the commander's guidance in detail.
	Brigade staff assistants (18)	P = 61% N = 11%	Communication Reporting Battle tracking
	Overall (28)	P = 61% N = 17%	
Improvement in brigade staff performance capabilities	Training audience (8)	P = 75% N = 12%	Ability of the staff to work as a team Planning Analysis of tools Understanding the information requirements of other staff members Providing an assessment of future training requirements
Training value for other participants	Roleplayers (25)	P = 64% N = 0%	TF Roleplayers: Insight into brigade combat team commander thought process Staff integration during execution Orders process Simulation experience Planning and preparation Seeing the entire battlefield Working with the brigade Cross training in other areas CSS requirements and operations Interfacing with other staff members Tactics BSA roleplayers: Skills in working with others. Increase staff planning knowledge. Coordination skills.

continued

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Figure 30 (continued). Summary of responses concerning training benefits.

Item Focus	Respondents (n)	Response Distribution	Comments
Training value for other participants (continued)			Fire support roleplayers: Better understanding of CSS. Close look at brigade and battalion orders process. Counter fire management. Q-36 positioning. Air defense roleplayers: Exposure the division and brigade operations. Cavalry troop roleplayers: CSS at troop level. CSS awareness. EXCON roleplayers: Set-up, coordinate, plan, and track status of equipment. Importance of cross-talk and coordination between division and brigade. Able to get a feel for how the DRC operates. Able to observe the complete orders process. Familiarity with CSS operations OPFOR Controller: Able to provide training to the brigade
	Interactors (28)	P = 29% N = 50%	Learned about cavalry troop operations. Battle plans. Organization of troops and equipment. Maneuver. Learned about BBS. Computer experience. TOC operations. Synchronizing all BOS elements of OPFOR
	Observers (5)	P = 80% N = 0%	
	Overall (58)	P = 48% N = 24%	

Figure 30 (continued). Summary of responses concerning training benefits.

Trial Implementation Conclusions

Overall, the trial confirmed that the TSP was supportive of exercise implementation, as there were no irrecoverable problems in any phase of exercise preparation or conduct. More than that, however, the trial demonstrated that the implementation model for the BSE is a viable and flexible means of providing training for the brigade staff. Trial results were to be used in the design and development efforts in follow-on training development efforts.

Summary

This section has described the BSE trial implementation in August 1996. During program development, each of the formative evaluation events was driven by specific objectives that focused on exploring TSP requirements, evaluating prepared TSP components, and/or examined perceived training benefits. As opportunity was provided, program aspects (e.g., the BBS training) that were developed during the early pilot were evaluated during the trial implementation.

Given the iterative nature of the evaluation events, almost all of the feedback collected was useful in improving the exercise. The improvement in the exercise was evident in that, by the time the TSP had been completed and delivered to ARI, unit comments and COBRAS team observations indicated that the exercise was indeed supportive of quality and valuable training for the brigade staff.

Although the development of the BSE was a large-scope effort that required the majority of the developers' time, the creation of the BSE was not the only focus of the project. Running parallel to the BSE effort was the vignette effort. The development of the COBRAS vignettes is discussed in the following section, with a description of the external pilot test in Section 9.

SECTION 8: DEVELOPMENT OF THE BRIGADE STAFF VIGNETTES AND TRAINING SUPPORT PACKAGE

The initial design and development work, described in Section 4, had direct application to construction of both the BSE and the vignettes. In particular, the scenario and training objective definition laid the groundwork for vignette development. Project staff had always anticipated that vignettes would represent "slices" of the overall scenario. The first attempts to define the appropriate slices, however, proved premature. In June 1995, a prototype vignette was designed and tried out (internally), and a prototype TSP was submitted to ARI. While the prototype served as a proof of concept, and as a basic model for later development, the project staff were unsuccessful in creating additional vignettes for the next several months. Each attempt resulted in a poorly conceptualized event, unclear definition of the specific training audience, and ambiguous task specifications.

It was not until project staff had completed initial preparation of the BSE TSP and were preparing to conduct the BSE pilot test (December 1995) that vignette work began in earnest, branching off of the BSE work. By this time, the scenario storyline and tactical materials were mature enough to provide a foundation for vignette development. The SPA activities were essentially completed by then, so that brigade staff processes were much better defined and documented.

This section describes the development of the vignettes (between December 1995 and May 1996), and is organized into three parts:

- *Vignette Development Process:* Gives a brief overview of the steps in vignette development. While the process follows the guidance of the methodology for structured simulation-based training, there are specific considerations that require explanation.
- *Description of the Vignettes:* Presents short abstracts of the content of each of the brigade staff vignettes.
- *Description of Vignette Training Support Package Contents:* Provides details of how the various TSP components for the vignettes were designed and the purpose each serves.

Vignette Development Process

As with the BSE, vignette development followed the guidance contained in the methodology for development of structured training (Campbell et al., 1995). However, vignette development represented a novel application of the process. While the four-phase process was useful in guiding the development, there were specific vignette requirements that led to expansions of the methodology guidance.[14]

In this section, each of the four phases (documenting initial decisions, designating training objectives, designing scenario and exercise [vignette] outlines, and developing the TSP) will be discussed within the context of vignette development. As with any structured training

[14] Revisions to the guidance are incorporated in the *Guide to Development of Structured Simulation-Based Training* (Campbell, Deter, & Quinkert, in preparation).

development, formative evaluation is not a separate phase, but is considered an integral component of development during all phases. These vignette formative evaluation activities during development will also be discussed below.

Document Initial Decisions

The first phase, documenting the initial decisions, had two parts for vignette development. The decisions made in Section 4 applied to vignette design as well as to design of the BSE. However, additional consideration was required in three areas:

- definition of the training audience,
- specification of the vignette scope (analogous to specification of the mission), and
- selection of simulation.

Although the training audience of 11 members of the brigade staff had been identified, each vignette required additional definition of the particular small group that would participate. This definition was inseparably tied to specification of the vignette scope, that is, the mission "slice" that would be the vignette situation.

Defining the vignette scope and the appropriate training audience members involved an initial tentative choice of event and participants, followed by gradual refining and shaping of vignette structure. This shaping process required developers to go through a four-step process (with multiple iterations):

1. Analyze thoroughly the events and activities before, during, and after the selected event.
2. Analyze and document the inputs and outputs of that extended event context.
3. Document all of the participants in each separable segment of the extended event context.
4. Finally, draw "the line" between activities and participants that will be in the vignette itself, and those that will not be part of the vignette.

The final step, drawing the line that separates what goes into the vignette from what does not, requires judgment on the part of the developer. It is of course essential that there be correspondence between the event activities and the selected participants. That is, the participants must be those who are actively involved in the event, and the event must focus on only that group of people. Everything outside the line is notional, scripted, or scripted out.[15] Three additional initial constraints—that the vignettes be short (3-4 hours), small (2-5 participants), and each one focused on a discrete event—were helpful in drawing the line.

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[15] To "script out" events is to completely account for their existence by, for example, structuring the conditions so that they do not affect the target event in any way, or to create the situation so that no such events are occurring. At any rate, a way is devised in which to put those extraneous events outside the responsibility of the training audience during the vignette itself. Other personnel may also be "scripted out" by having their inputs prepared in advance, or by providing guidance to the training coordinator on how to play the other personnel.

As a result, the vignette-specific methodology had to contain more guidance related to defining the scenario than had earlier been provided. Where a large-scale integrated exercise could incorporate a number of simultaneous events that were either parallel or interactive, vignettes would, by design, focus on a single event and deliberately script out any other simultaneous events. As a consequence, each vignette required a lengthy and detailed analysis of the tactical conditions and situation in order to maintain the focus only on the selected event and training audience, and to provide the necessary scripting out of extraneous information or distractions.

Use of simulation in vignettes is also somewhat different than had been discussed in the methodology. Initial attempts to formulate simulation-based vignettes were attended by considerable frustration, leading developers to regroup and analyze the costs and benefits of using simulation. In terms of benefits, simulation has the potential for providing significant training benefit. Developers listed at least six ways in which simulation could enhance training, including:

1. Simulation can provide a cost-effective alternative to field (live) training.
2. Simulation can enhance tactical realism in home-station environments.
3. Simulation can permit users to see the outcomes of their decisions and actions.
4. Simulation is useful in providing standardized training conditions.
5. Simulation may provide instructional features that enhance efficiency and effectiveness, including performance measurement.
6. Simulation with replay capabilities can support providing objective feedback.

However, if the simulation does not significantly achieve one or more of these advantages, then it is not an enhancement to training. In the case of vignettes, developers found that simulations were generally not of sufficient benefit to justify the resource cost. Specifically:

- Because brigade staffs are located primarily in CPs, live (field) training for the brigade staff *alone* is relatively low cost; the expense comes when we attempt to place weapon systems on the ground (something that simulation does well).
- The tactical realism provided by simulation is unnecessary for planning activities, which constitute a significant proportion of brigade staff work.
- The short time duration of vignettes is insufficient to allow the simulation to portray outcomes of decisions and actions.
- Instructional features such as replay capabilities are inappropriate for what the brigade staff does.

Depending on the simulation, the costs can be quite high. As shown in Figure 9 (Section 4), a full brigade exercise can require between 5 and 28 additional interactors (simulation operators), at a minimum; the recommended number of interactors ranges from 15 to 28. Unfortunately, a vignette exercise that focuses on a small group of brigade staff members requires the same load of interactors. Thus the cost-benefit considerations lead to the conclusion that simulation is not a significant contributor to training value, unless:

- The vignette scenario requires representation of weapon systems or troops to provide *essential* tactical realism, cue the training audience, and react to the training audience.
- The vignette can be extended to more than 4 hours, to allow the situation to develop.

The alternative to using technology-based simulations is to use "live" simulation. In the context of vignettes, this is relatively easily accomplished. The brigade staff, normally located in a CP, can perform the vignette in an administrative CP (i.e., any room large enough to work in). Communications may be represented by means of written messages or by having the training monitor simply provide any necessary information. By using this type of simulated environment, resource costs are kept low, and the training becomes more accessible for brigade staff development sessions (the "Thursday morning" sessions).

In the final analysis, only two vignettes justified use of technology-based simulation. In both vignettes, the training event is sliced from the execution portion of the scenario. Therefore, the tactical realism provided by a constructive simulation was essential. Additionally, the simulation offered the most cost effective and efficient way of presenting performance cues and performance feedback. Because the training audience was somewhat larger for these two than for other vignettes, and the vignettes were allowed to be constructed as 8-hour exercises, developers were satisfied that the training would certainly be enhanced by the use of simulation.

Designate Training Objectives

The focus in the vignettes was always on the performance of the vignette group, rather than on the isolated performance of any individual members. The task lists that were the primary outcome of the SPA (described in Section 4) were therefore examined and aggregated across persons in order to produce group performance descriptions.

These performance descriptions were to serve two purposes. They would give the training participants a preview of the performance expectations for the vignette, and they would give the training coordinator a guide for observing and providing coaching to the participants. Additionally, each vignette performance description was further elaborated by a set of AAR questions and considerations. After conduct of a vignette, the training coordinator could use any or all of the AAR questions, together with his own observations, to focus the AAR on specific performance issues. The accompanying considerations were to assist him to further focus the questions. They were not "correct" answers; rather, they specified the critical elements of each performance component.

Design the Scenario and Vignette Outline

During Phase 1 design work, the particular event that formed the basis of each vignette was defined, and the surrounding events were also documented. Developers worked from that information to add structure to the vignette. Specific details were worked into the initiating conditions to set up the situation and give the starting cues, and the particular form for providing the details had to be decided. For example, the requirement to conduct a quick course of action (COA) development could be cued by a statement of commander's intent, the particular posture of the enemy, or even the amount of time available in the scenario storyline.

The vignette outlines were structured worksheets, completed by developers, that detailed the information that would be included in the vignette. A sample vignette outline is shown in Figure 31.

WORKING TITLE: Develop a Plan to Conduct Refuel on the Move (ROM)

TRAINING PARTICIPANTS: S4 and FSB Commander

MISSION CONTEXT: MTC, planning

SIMULATION: None (live simulation only)

PERSONNEL SUPPORT: Observer/Training Coordinator

PERFORMANCE OBJECTIVES:

1. Compute fuel requirements.
2. Determine haul capability.
3. Determine refuel method.
4. Determine refuel time.
5. Select refuel site and route.
6. Establish security requirements at refuel area.
7. Determine travel and departure time and establish linkup time at refuel site.
8. Assign resources (trucks and personnel) for mission.

MATERIALS REQUIRED:

Map (1:50,000) with graphic control measures overlay including BSA location and attack position (ATK) location.

Description of situational requirements, including transportation and refuel assets available. Task organization (tanks and Bradleys) must also be specified.

OTHER EQUIPMENT: None

PERFORMANCE TIME: About 30 minutes, not including preparation or AAR.

CONCEPT: At least one TF must leave the AA and travel for 3 hours before reaching LD. To sustain the MTC, that unit will have to refuel in an ATK just prior to crossing LD. The unit must meet its LD time. The S14 and FSB must determine the fuel load requirements, assets available and required, and determine the time table to accomplish the refuel mission.

Primarily product-scored. In order to avoid presenting a "canned" problem, may develop a variety of situations that affect TF composition, fuel consumed, or distance to be traveled.

Figure 31. Sample vignette outline.

Develop the Vignette Training Support Package

Because the vignettes were to be independent, stand-alone exercises, developers had to find a way to provide all of the background and instructions to users without repeating the information in every vignette. This was accomplished by gathering all of the general information into a single "Guide to Use and Implementation of Vignettes" which serves as the training management component of the TSP.

Individual vignette TSPs contain all of the necessary information for conducting that vignette. Each vignette TSP consists of a Training Coordinator Guide, which also contains tactical materials that are to be used during the vignette, and a Training Participant Guide, containing the tactical materials for use in preparation. The two simulation supported vignettes also contain a Support Coordinator Guide that described the simulation requirements and other participants.

To help units implement the vignettes, developers made sure that the individual vignette TSPs had similar structure and appearance. This was accomplished by using a standard vignette shell, to which vignette-specific information would be added. Of course, the differences among vignettes was such that the shell itself served more as an outline than as a template.

As described in Section 4, the vignettes require 1-2 days of preparation time. Additional participants may be brought in by the training participants to assist in the less critical staff tasks (e.g., posting maps, preparing overlays). The training coordinator is expected to be the brigade XO.

Formative Evaluation Activities

The formative evaluation process of examine-evaluate-refine presented a somewhat different challenge for vignettes than it had for other structured training programs. Because the vignettes are relatively small (in terms of time, personnel, and equipment requirements), multiple tryouts of each vignette were easy to support. The nature of the performance descriptions as group rather than individual tasks, and the nature of the vignette scenarios as abstracted events made it crucial to try out and evaluate each one throughout the stages of development. However, the sheer number of exercises, coupled with the absence of a combined arms brigade at Fort Knox, meant that full trial implementation was impossible, and a pilot test was only partially supportable.

Therefore, developers relied on multiple internal tryouts of the vignettes, using project staff personnel. These tended to take three forms, depending on the stage of vignette development:

- As the event was first being defined and limited, developers conducted event walkthroughs. These low-fidelity rehearsals of the vignette event and other contextual activities helped to identify distracter events and narrow the vignette focus to a single, well-defined event.
- Once the initial tactical stimulus materials were drafted and decisions had been made (tentatively) about how to introduce and initiate the vignette, a roleplay of the vignette was conducted using project staff who had not worked on that vignette. Observations and debriefing at the end of the vignette enabled developers to evaluate the consistency

among the tactical pieces, the performance descriptions (tasks), and the AAR questions and considerations. Usually the roleplay also ended with the production of tactical products that are normal outcomes of the event.

- After further revisions were made, another walk-through was conducted to finalize the tactical materials and other stimulus materials, and a thorough editorial and instructional review of the materials ensured that the TSP was correctly constructed.

For most of the vignettes, a pilot test was conducted using U.S. Army soldiers. The pilot tests and results are discussed in Section 9.

Descriptions of the Vignettes

Although the SOW called for 12 vignettes to be developed, the development proceeded with 13 vignette concepts. An extra one was included in case one of the vignettes turned out to be a poor or impossible selection. However, all 13 vignettes survived through the pilot testing and eventual production.

The 13 vignettes are described in Figure 32, in terms of the objective, tasks, and participants of each.

Vignette Title	Participants	Objective and Tasks
1: Plan for Dislocated Civilians	S1, S2, S4	**Objective:** Develop a plan to control dislocated civilians (DC) in the brigade area of operations. **Tasks:** 1. Determine routes and time estimates for the movement of DCs. 2. Estimate transportation requirements. 3. Identify a disposition and destination point. 4. Plan for intelligence processing. 5. Identify security requirements. 6. Identify DC Class I requirements. 7. Identify DC medical support requirements.
2: Plan Refuel on the Move	S4, FSB Commander	**Objective:** Develop a refuel on the move (ROM) plan. **Tasks:** 1. Identify ROM locations. 2. Allocate resources that meet haul requirements. 3. Identify equipment that meets the refuel requirements. 4. Incorporate and meet the brigade commander's guidance on conduct of the ROM. 5. Identify tactical coordination issues.

Continued on next page

Figure 32. Description of the participants, objectives, and tasks for the 13 vignettes.

Vignette Title	Participants	Objective and Tasks
3: Develop a Concept of Service Support	S1, S4	**Objective:** Develop a concept of service support for the brigade tactical mission. **Tasks:** 1. Analyze the concept of the operation from the brigade OPORD input. 2. Allocate CSS requirements for each operational phase (before, during, and after). 3. Determine the priorities for each operational phase (before, during, and after). 4. Identify CSS security requirements for each tactical phase (I, II, III, IV, and V) and each operational phase (before, during, and after). 5. Prepare a concept of support matrix. 6. Write paragraph 4 of the OPORD.
4: Develop Reconnaissance and Surveillance Plan	S2, S3	**Objective:** Develop a reconnaissance and surveillance (R&S) plan for two enemy courses of action (COA). **Tasks:** 1. Develop the initial enemy COAs. 2. Analyze the information on each enemy COA and the impact on friendly intelligence requirements. 3. Determine the R&S plan requirements for each enemy COA. 4. Review the initial R&S collection plan for each enemy COA. 4.1 Review the NAIs from both enemy COAs to combine, confirm, or deny them. 4.2 Revise the event template. 4.3 Complete the R&S collection matrix. 5. Determine if the initial R&S plan is suitable, feasible, and acceptable.
5: Conduct Target Development	XO, S2, S3, FSO	**Objective:** Conduct the first step - the decide function- of the targeting process. **Tasks:** 1. Select high payoff targets (HPT) from the brigade high value target list. 2. Prioritize HPTs. 3. Complete the target selection standards matrix. 4. Complete the attack guidance matrix. 5. Determine if the brigade assets can support the attack guidance matrix.

Continued on next page

Figure 32 (continued). Description of the participants, objectives, and tasks for the 13 vignettes.

Vignette Title	Participants	Objective and Tasks
6: Develop Air Defense Concept	S2, S3, ADCOORD	**Objective:** Develop and wargame an air defense (AD) concept to support the brigade COA. **Tasks:** 1. Develop the air defense course of action. 1.1. Identify the enemy situation. 1.2. Review the brigade scheme of maneuver. 1.3. Identify and evaluate all of the brigade assets in terms of criticality, vulnerability, and recuperability. 1.4. Develop and air defense coverage plan. 1.5. Evaluate if the AD COA is suitable, feasible, acceptable, and complete. 2. Wargame the air defense course of action. 2.1. Identify the critical air defense events to wargame. 2.2. Wargame using the action/reaction/counteraction method. 2.3. Identify the AD COA strengths and weaknesses. 2.4. Finalize the AD COA. 3. Identify the key air defense information for inclusion in the brigade OPORD.
7: Develop Contingency Plan	S2, S3, FSO, Engineer	**Objective:** Develop a branch contingency plan to the brigade's COA. **Tasks:** 1. Develop a contingency plan to the COA to meet the situational requirements and to fulfill the commander's guidance. 1.1 Analyze the branch enemy forces and activities. 1.2 Develop contingency maneuver options. 1.3 Develop contingency engineer and fire support options. 2. Wargame the contingency plan. 2.1 Conduct action/reaction/counteraction drills. 2.2 Identify tasks to subordinate units 3. Develop products to support the contingency plan.
8: Conduct Mission Analysis	XO, S1, S2, S3, S4, FSO, Engineer, ADCOORD	**Objective:** Conduct mission analysis. **Tasks:** 1. Identify facts and assumptions 2. Identify specified, implied, and essential tasks. 3. Identify limitations - restrictions and constraints. 4. Produce a restated mission. 5. Prepare staff estimates. 6. Brief the conclusions of mission analysis.

Continued on next page

Figure 32 (continued). Description of the participants, objectives, and tasks for the 13 vignettes.

Vignette Title	Participants	Objective and Tasks
9: Develop Courses of Action	XO, S1, S2, S3, S4, FSO, Engineer, ADCOORD	**Objective:** Develop two brigade COA. **Tasks:** 1. Analyze relative combat power. 2. Generate COA concepts and ideas. 3. Array initial forces. 4. Develop scheme of maneuver. 5. Determine command and control and maneuver control measures. 6. Develop COA statements and sketches. 7. Determine if each COA is suitable, feasible, acceptable, distinguishable, and complete. 8. Conduct a COA brief.
10: Conduct Course of Action Analysis	XO, S1, S2, S3, S4, FSO, Engineer, ADCOORD	**Objective:** Conduct analysis of COA **Tasks:** 1. Establish wargaming parameters. 2. Establish COA comparison criteria. 3. Conduct wargaming. 3.1 Describe the enemy COA. 3.2 Describe the friendly COA. 3.3 Wargame critical events independently. 4. Complete a decision support template (DST) for each COA. 5. Conduct a comparison of the two COAs. 6. Conduct a COA recommendation briefing.
11: Conduct Special Staff Rehearsal	XO, S2, S3, FSO, Engineer, ADCOORD	**Objective:** Conduct a main CP special staff rehearsal. **Tasks:** 1. Establish the rehearsal agenda. 2. Describe the area of interest (AI) and the enemy situation. 3. Describe the concept of the operation. 4. Rehearse critical events using the action/reaction/counteraction technique. 5. Contribute input to each critical event. 6. Record staff input and changes or new requirements. 7. Critique the rehearsal, identifying any changes or new requirements.
12: Coordinate Mission Operations	XO, S2, S3, FSO, Engineer, ADCOORD	**Objective:** Conduct main CP operations during the performance of a deliberate attack mission. **Tasks:** 1. Coordinate the brigade's deep operations. 2. Monitor close operations and events. 3. Synchronize combat support operations in support of maneuver requirements. 4. Maintain internal CP functions and operations.

Continued on next page

Figure 32 (continued). Description of the participants, objectives, and tasks for the 13 vignettes.

Vignette Title	Participants	Objective and Tasks
13: Coordinate Mission Transition--Offense to Defense	XO, S1, S2, S3, S4, FSO, Engineer, ADCOORD, FSB Commander	**Objective:** Coordinate the transition from a movement to contact mission to an area defense mission. **Tasks:** Main Command Post Tasks: 1. Coordinate the brigade's deep operations. 2. Monitor close operations and events. 3. Synchronize combat support operations in support of maneuver requirements. 4. Coordinate rear operations. 5. Plan for future operations. Rear Command Post Tasks: 1. Track the battle 2. Track battle damage and maintenance status reports. 3. Maintain personnel status updates. 4. Maintain status of available medical personnel and facilities. 5. Provide CSS and personnel estimates to the main CP. 6. Plan for the support of future operations 7. Implement reconstitution procedures. Main and Rear Command Post Tasks: 1. Maintain internal CP functions and operations. 2. Coordinate operations between main and rear CP locations.

Figure 32 (continued). Description of the participants, objectives, and tasks for the 13 vignettes.

Description of Vignette Training Support Package Contents

As stated earlier, all of the vignette TSPs had a similar structure. The structure and a general description of the contents of the vignette guides are presented in Figure 33.

A description of the contents of the overall training management guide, the "Guide to Use and Implementation of Vignettes," is presented in Figure 34. This guide was not developed until after the pilot test of the vignettes in February-March 1996 (described in Section 9).

Participant Guide	
General orientation to the vignettes, list of tasks, description of the scope of the activity involved in the vignette, references, preparation guidance. Tactical materials to be used during preparation. May include orders, overlays, INTSUMs, COA descriptions, annexes, or decision matrixes, as appropriate to the vignette.	Specific version for each vignette. Distributed to all primary participants (not "other" participants) during the Administrative Brief, several days before the vignette takes place.
Training Coordinator Guide	
General orientation, as well as specific guidance for preparation and conduct of the vignette: • Administrative Brief for participants' orientation, • description of participant preparation activities that the Training Coordinator oversees, • Situation Brief to begin the vignette; may provide a tactical update or implementing instructions, • suggested processes for staff performance (job aids for participants), • models of expected outcomes or products (sample solutions), • information on organization and conduct of AARs, • AAR questions that can be used.	Specific version for each vignette. Supplements general guidance found in the "Guide to Use and Implementation."
Support Coordinator Guide	
Information on setting up and conducting the two simulation-supported vignettes. Contains: • technical information for the simulation site, including simulation file tapes; • instructions for training roleplayers and interactors; • guidance on conducting the vignette.	For vignettes 12 (Janus-based) and 13 (BBS-based) only.

Figure 33. Description of contents of vignette Training Support Package guides.

Guide Overview, Purpose and Scope of the Guide	
Introduction, Format, and Contents of the Guide	Tells how the Guide is organized and who to contact for more information.
COBRAS Vignettes Frequently Asked Questions	
About Structured Training	Tells about the COBRAS program; defines vignettes, structured training, and TSP; explains how vignettes are used.
About Vignette Content	Vignette activities, participants, and the training intent.
About Simulation	Simulation-based and "live" simulation vignettes.
About Support Requirements	Support requirements for simulation-based and "live" simulation vignettes.
About Managing Vignette Training	Roles and responsibilities of the brigade and the XO in implementing vignettes; duties of the Training Coordinator.
About Other Participants	Who else may or should participate.
About the Brigade Commander's Role	Brigade commander as training leader and as participant.
About the TSP	Organization and content of the TSP materials; how to obtain more copies; about modifying vignettes for unit SOP and unit task organization; how to field tactical questions from participants.
About Site Requirements and Supplies	Supplies, overlays, maps, and physical site setup.
About Vignettes and Training Strategies	Relationship to the BSE and among vignettes; incorporating vignette training with other staff training.
About Time Requirements	Actual vignette time and preparation time, preparation activities.
About Training Feedback	Evaluation and feedback; source of vignette tasks and sample solutions; how to prepare for and conduct the AAR; coaching.
About Implementing	How to get started.

Figure 34. Description of contents of vignette training management component.

Summary

This section has given a complete description of the vignette development process and the resulting TSP. The next section describes the pilot tests of the vignettes and how the results were used in refining the vignettes.

SECTION 9: VIGNETTE PILOT TESTS AND QUALITY REVIEW

By February 1996, all 13 of the vignettes had been conceptualized. For each vignette, developers had completed initial versions of the tactical materials, objectives and performance requirements, and AAR questions (described in Section 8). Although complete TSPs had not yet been assembled, development was sufficiently advanced to allow pilot tests to be conducted.

This section describes the pilot test plan and the associated formative evaluation objectives. It also documents constraints that limited the scope of the evaluation. The evaluation findings and the revisions made to the TSP as a result are then presented. The evaluation findings represent both feedback provided by participating units and observations made by COBRAS staff members, and provide a comprehensive summary portrayal of the data collected.

Vignette Pilot Test Plan

The project staff was prepared to conduct a pilot test of the completed vignette TSP components in February 1995. The pilot test would include portions of all vignettes, and use actual brigade personnel in the key positions. The simulation vignettes would be partially staffed by COBRAS developers.

However, as with the BSE, ARI's requests for troop support could not be filled: No brigades were able to participate in a pilot implementation. Instead, the plan was revised to include an external pilot of selected vignettes, using battalion-level personnel in the training audience roles.

This section presents the objectives and constraints of the pilot test, the feedback collected from the pilot unit and COBRAS staff members, and a description of resulting revisions. It then also describes the final quality assurance review process.

Objectives

The objectives of the pilot were to obtain information to assist in revision of all of the vignette components. These components, and the nature of the pilot test questions, included:

- The vignette concept – objective, tasks, training participants, other action items;
- The administrative brief;
- The execution brief or tactical update (right before execution of the vignette);
- The tactical materials – all needed materials provided, no unnecessary materials, how to improve;
- Overlays – matched execution brief, correlated with tactical materials, any additional control measures needed;
- AARs – Training Coordinator used the AAR questions, AAR question helpful in observing and in facilitating AAR, clear instructions, suggestions for improvements;
- Timing – preparation time provided and needed, execution time provided and needed, AAR prep and delivery time;
- Training Coordinator Guide – role explained clearly, additional information needed, no unnecessary information;

- Training Participant Guide – additional information needed, no unnecessary information;
- Simulation (if used) – maneuver, OPFOR, CSS, HICON; and
- Support Guide (if simulation involved) – TF CS roleplayer matrix, interactor instructions, rules of engagement, OPFOR guidance, simulation site instructions.

Pilot Test Conditions

The pilot test conditions for the vignettes were not entirely as anticipated or requested. The primary departure was that the training audience members were not from an AC brigade. The target training audience consisted of battalion-level personnel and other personnel with no brigade staff experience, rounded out by COBRAS staff members. This constraint limited the utility of the pilot in providing valid information about how a brigade would or could use the vignettes.

The Training Coordinator for the pilot test was a battalion XO. Because of his normal unit tasks, he was unable to devote his full attention to the vignettes. He had little time to spend preparing for the administrative briefing and tactical update, and did not thoroughly review the AAR questions prior to each vignette.

Nonetheless, the openness and willingness to help on the part of the pilot test participants was instrumental in obtaining useful feedback and suggestions about the vignette TSP contents and structure.

Pilot Test Results

The observations made by the COBRAS team and the results of the discussions with participants were critical to the vignette refinement process. They indicated aspects of each of the vignettes that needed to be revised. While listing all of the findings for each vignette would be too lengthy a presentation, three recurring reactions should be discussed. Each was the subject of discussion during several vignettes, and so the revision indicated was made to all vignettes. The four areas concerned:

- the amount of reading required,
- the presentation of AAR questions,
- the provision of sample solutions, and
- designating participants.

Reading Requirements

Based on comments from the participants as well as observations from the COBRAS staff, it was apparent that participants frequently found the amount of reading required in preparation to be onerous. At any rate, for whatever reason, they did not always study their materials prior to the exercise. This made it very difficult to draw any inferences concerning the thoroughness of the materials and guides.[16]

[16] However, it provided valuable information for preparation of a recommendation for multimedia presentation of vignette materials (Hoffman, 1997).

As a result, developers attempted to reduce still further the amount of printed materials accompanying each vignette. It was almost always possible to reduce the amount of tactical materials, by providing situation summaries rather than complete annexes or OPORDs. However, a certain amount of background information is critical to performance in vignettes, as it is to performance in real world situation. It cannot be completely removed.

After Action Review Materials

Comments from participants and observations by COBRAS developers led to three simple conclusions on the AAR questions:

- The questions should be short and clear, without any unnecessary verbiage.
- Because it is intended that the questions should lead to discussion, yes/no questions should be avoided.
- Sample answers or answer considerations would also be helpful.

Each of these concepts was incorporated into the vignette materials.

Sample Products

Before the pilot implementation, some of the vignettes had been prepared with sample products, representing an acceptable way to perform the vignette. While COBRAS staff were reluctant to use these products as "right answers," the vignette participants found them to be useful as models of what their own products should contain or consider. As a result, sample products were prepared for most of the vignettes.

Designating Training Participants

During initial vignette development, there was a slight trend towards including as many participants as possible (within reason) in some vignettes. These were sometimes individuals who would not necessarily have an active role, but who might be called on to answer a question or who might benefit from being tangentially involved in the process.

Pilot test observations indicated that including persons who were likely to be peripherally involved, at best, was most likely to be perceived as a waste of the person's time. Therefore, vignette developers scrubbed all vignette participant lists to insure that the vignettes did not lose their small group focus and intensity.

Another finding concerned the Training Coordinator. Observing the battalion XO direct the training and facilitate the AARs made it obvious that a unit XO is the most likely person to serve as the Training Coordinator.

Vignette Quality Assurance Review

As with the BSE, COBRAS staff conducted a thorough scrub of the vignettes after the pilot. Only COBRAS personnel were involved. Military representatives from FXXITP and ARI sat in on most of the pilot test itself, and provided their feedback on the tactical materials at the time the vignettes were performed.

The review led to a complete and consistent TSP for the live simulation vignettes. However, the constructive simulation-based vignettes presented more difficulty. Participants had

commented on the extensive support requirement, prompting developers to look for additional ways to reduce the support burden. As COBRAS II was also to develop simulation-based vignettes, it was decided that the development of all of the simulation-based vignettes would be coordinated, so as to produce TSP components that took advantage of multiple attempts at incorporating simulation.

Summary

This section has described the pilot test and quality assurance review of the vignette TSPs. The indicated revisions were incorporated into the TSP materials, which were submitted to ARI in July, 1996. This section concludes the presentation of the development and evaluation process of the COBRAS training exercises.

The next section describes the overall lessons learned from the COBRAS project.

SECTION 10: LESSONS LEARNED

During the past 15 years, the Army has placed increasing importance on building structured simulation-based training into unit training strategies. It quickly became evident that the simulations alone cannot provide for a focus on explicit training objectives, but that more extensive structuring must be incorporated into the programs. Some of the first R&D efforts to incorporate structure into battalion and brigade-level training programs were accomplished by ARI and contractors through the initial development and expansions to the VTP and the development of the COBRAS program, the subject of this report. Initial evaluations of such programs have indicated that, with a well-developed training structure, simulation can contribute substantially to the value of training (Hoffman et al., 1995; Shlechter, Bessemer, Nesselroade, & Anthony, 1995).

Program developers and sponsors, however, are well aware that the structured approach and development methodologies can always be improved. To that end, each of the ARI projects has produced a report, documenting "lessons learned" that may be useful in future development efforts (Hoffman et al., 1995; Graves & Myers, 1997; Koger et al., 1996). The lessons learned during the COBRAS project represent the latest set, and are described below.

This project's lessons were drawn from formative evaluation efforts[17] in which design solutions and training support materials were evaluated in terms of their quality and their support of explicitly defined training objectives. Some of the lessons deal with the development process, while others address the types of products created and program design characteristics. All, however, will be of use to future program developers, whether they are design scientists who are responsible for delineating project objectives and design alternatives, or military and instructional specialists who construct TSPs. The lessons can be grouped into eight topics; the topics and the lessons are shown in Figure 35 and are discussed fully in this section.

Partial Assessment of the Methodology for Development of Structured Simulation-Based Training

The development methodology (Campbell et al., 1995), described earlier in this report, is the model by which the COBRAS training was developed. During the course of the project, a number of lessons were learned regarding the implementation of this methodology. Two of these lessons, representing major strides in assessment of the methodology, deal with the processes of identifying and approving initial decisions and constraints, and the quality review process.

Identification and Approval of the Initial Decisions and Constraints

The first lesson states:

> *The initial decisions and constraints must be identified as completely as possible, and all stakeholders should review them and concur.*

[17] Here again, as throughout this report, "formative evaluation" refers to the project-long cycle of examine-evaluate-refine (as described in Section 4).

Lessons Learned Topics	Lesson
Partial Assessment of the Methodology for Development of Structured Simulation-Based Training	The initial decisions and constraints must be identified as completely as possible, and all stakeholders should review them and concur. In developing structured training programs, the conduct of all formative evaluation activities is critical.
Methods for Providing Structure in Training	The scenario-based structure must be tailored to the program's objectives. Training management guidance must facilitate quick decision-making about the course of an exercise. Job aids are key to maintaining the scenario structure, and thus, to facilitating training objective performance.
Maximizing Training Benefit	Training programs should maximize and then clearly state the benefits attainable for all participants.
Accounting for User Needs in Training Program Design	Developers should be aware of the expectations and needs of prospective users, and determine when these may be in conflict with other development requirements. A balance should be achieved between the two.
Alternative Training Strategies	Decisions on incorporating realism features, such as 24-hour operations or field CPs, into a training program should be based on the program training objectives, and consistent with enhancing the value of the program.
Fielding, Sustaining, and Maintaining Structured Simulation-Based Training Programs	The Army must design and implement the mechanisms required to field, sustain, and update structured training programs, just as it does for operational systems and training devices.
Conducting Effective Formative Evaluation Pilots and Trials	The evaluation design should involve experts in evaluation, training program developers, and development team leaders. Product development schedules should include planning the formative evaluation.

Figure 35. Lessons learned categories and lesson statements.

The methodology for development of structured simulation-based training (Campbell et al., 1995) devotes the entire first activity to the importance of identifying and documenting initial decisions. These include such matters as the training audience, missions (and phases), simulation, terrain, and OPFOR type. The COBRAS team followed this guidance by thoroughly researching all of the issues, laying out and examining the options, and carefully outlining all of the specifications concerning these and other design issues.

As a result of this attention to detail and ensuring that all parties understood the decisions and the implications, the training alternatives chosen were relatively well-accepted during implementations of the training. For example, the focus on selected members of the brigade staff

and on their interactions was specified from the beginning. The reasons for that focus were examined and justified during the first several months, explained to stakeholders, accepted by those stakeholders, and subsequently accepted by user units as well.

Formative Evaluation Activities

This lesson states that:

> *In developing structured training programs, the conduct of all formative evaluation activities is critical.*

There are six formative evaluation components identified in the development methodology, which span the scope of the development process. An additional component, the quality assurance review, was identified during the COBRAS project. The formative evaluation components include:

Component 1. Sponsor/proponent review of the initial decisions and constraints.

Component 2. Proponent/expert review of scenario.

Component 3. Proponent/expert review of tasks.

Component 4. Internal pilot test of scenario and design.

Component 5. External pilot test of exercise procedures with knowledgeable personnel.

Component 6. Quality assurance review.

Component 7. Trial of full TSP with representative participants.

The purpose of the various reviews is twofold. The primary purpose is to obtain information for refining and improving the training program during its design and development. The second purpose is to assure the program proponents that the design and development, and the products, have received a stamp of approval from credible reviewers.

As described in Sections 4 through 9 of this report, each of these activities was performed during the course of the COBRAS work. As a result, significant information relating to program revisions and improvements was obtained and used. Representative users of the program components were able to provide valuable input, and the Army and training communities were satisfied that the components had received thorough review and testing.

Because of the criticality of this lesson, each of the seven formative evaluation activities, as conducted during the COBRAS project, is described and discussed below.

Component 1. Sponsor Review of the Initial Decisions and Constraints

As decisions were made or constraints explicitly identified, they were briefed to the sponsor, ARI, at regular weekly meetings. Sometimes developers obtained the go-ahead; other times, changes in direction or further deliberation were necessary. Although this process was relatively unstructured, its continual nature ensured an informed and involved sponsor. Frequent IPRs that involved ARI and other government personnel identified by ARI as critical proponents of the project were also instrumental in ensuring that all stakeholders were fully informed.

Component 2. Proponent/Expert Review of the Scenario

During the COBRAS design and development process, developers obtained a review of the corps and division orders by personnel at the CAC, Fort Leavenworth. Not only was their input valuable in improving the tactical materials used in the exercise, but the CAC review satisfied other reviewers from different sponsoring agencies (e.g., USAARMS, Directorate of Training and Doctrinal Development, the NTC), who had differing opinions regarding tactics.

Component 3. Proponent/Expert Review of Tasks

The COBRAS Team was less successful in obtaining proponent reviews of the SPA-generated task lists. During the December 1995 pilot test, portions of the task lists were reviewed by active Army officers who served as observers. The feedback, however, did not provide the official approval that would have been useful.

The August trial implementation also provided valuable input. The observers were a mixed group, drawn from a Regional Training Directorate and from the staff of Fort Riley. The feedback was both positive and critical. Some comments concerned doctrinal accuracy and some suggested restructuring the tasks to provide conditions, standards, and staff product descriptions. Finally, it was suggested that developers should identify the link between the COBRAS tasks and doctrinal references (e.g., the ARTEP-MTPs, FMs).

Component 4. Internal Pilot Test of Scenario and Design

The internal pilot tests of the BSE occurred in conjunction with the SPA activities. As the brigade staff, composed of COBRAS military SMEs, enacted each mission phase, they also produced or verified the consistency and completeness of the tactical materials, OPFOR plan, scripted messages, BBS initialization files, and other components. During these tryouts, developers also created the initial roleplayer and interactor materials, and generated information for the exercise schedule. The approach taken was useful and verified the requirement in the development methodology.

Internal pilot testing of vignettes was somewhat different. Only the vignette concepts, tactical scenarios, and the AAR questions were reviewed. However, the information gathered was so valuable in continuing development of the vignettes that even a partial pilot test is seen as critical within the development process.

Component 5. External Pilot of Exercise Procedures with Knowledgeable Personnel

For the pilot test of the exercise procedures with knowledgeable personnel, it is assumed (according to the methodology) that participants will have expertise about training in general and about structured stimulation-based training in particular. They should also have a baseline of expertise similar to that of the target participants. Thus, developers had hoped to involve other training developers who would understand brigade operations or specific force multipliers, but who would be naive with respect to the COBRAS program itself. Because there were not enough of these individuals available for a pilot, developers then intended to use Army personnel with the requisite military expertise. The training expertise deficit would be made up by having COBRAS staff close at hand to observe, assist, take notes, ask questions, and fill in as needed.

In fact, the U.S. Army personnel who participated in the BSE pilot test were, for the most part, a full echelon removed from the target in terms of expertise. That is, brigade staff positions

were played by battalion personnel, battalion by company, and so on. Several of the BOS representatives had little recent experience, although they were in the appropriate branch. Additionally, because the battalion had other, real-world missions, the tryout focused only on the MTC and AD missions.

The information derived from the BSE pilot was of mixed utility. When problems with the prototype materials were observed, developers were often unsure how to separate the effect of the quality of written instructions from the effect of non-target users. Although developers incorporated as much of the information as seemed valid, the suspicion remained that the scenario, design, and materials had not yet been really tested and evaluated.

The COBRAS team had considerable difficulty in obtaining target audience personnel for vignette pilots as well. Participants were once again a full level removed from their assigned positions in experience, and COBRAS staff members were needed to step into many of the roles due to the nonavailability of Army personnel. The pilots did yield some information regarding the implementability of individual vignettes, but, as with the BSE, the reliability and validity of the data are suspect.

The full utility of pilot testing has yet to be measured. Developers were aware of and vocal about the absence of information that would contribute to confidence in the materials or guidance on how to modify materials. The requirement of pilot testing within the methodology should not be abandoned until it is either shown to be ineffective or until an adequate substitute is discovered.

Component 6. Quality Assurance Review

Developers were concerned about the degree to which the materials were understandable and consistent with respect to each other. Thus, an additional formative evaluation step was added, partly to make up for the lack of a fully acceptable tryout. The BSE quality assurance review, described earlier, provided the opportunity to make a final and thorough reading of the products to improve consistency, correctness, and readability.

If the sheer amount of corrections and revisions is any criterion for success of a review effort, then the quality assurance review was wildly successful. Simultaneous review by persons with varying perspectives on the training and the TSP brought numerous inconsistencies and inadequacies to light. This activity should probably be an essential component in the development of every TSP.

Component 7. Trial of Full TSP with Representative Participants

In general, the following four elements represent the characteristics of a trial implementation:

1. The full implementation process should be enacted (from long term planning through near term planning to participant training and conduct of the exercise itself; and with the full participation of all designated personnel or representative surrogates).
2. Observers from the development team should be on hand for every phase of the process, and thorough discussion sessions, interviews, and questionnaires should be employed.

3. Observers from the development team should primarily observe, assisting only when necessary to prevent the exercise process from collapsing.

4. All elements of the design model should be adopted by the trial unit.

Even though it did not follow all four of these precepts rigorously, the BSE trial at Fort Riley in August 1996 was invaluable. The following paragraphs address the departures, and their consequences.

Implementation and personnel inadequacies. First, the trial should have begun with a naive brigade commander or G3 deciding to conduct the exercise. The brigade would select the missions using the *Brigade Orientation Guide*, and the Exercise Director and COBRAS Coordinator would be designated. With little or no outside assistance, the unit would obtain the TSP, prepare the materials, task for participants and other resources, brief the brigade and division leadership as needed, distribute materials, conduct preparation and pretraining activities, and conduct the exercise itself. All participants would study their TSP materials, work in groups as specified in the TSP to prepare for the exercise, and participate in all of the appropriate portions of the exercise.

For the most part, these activities occurred as planned. However, there were several departures. First, the unit decided to conduct only the MTC. It would conduct the AD and DATK under different conditions a month later. The timeline specified in the TSP was compressed significantly, but the division and brigade leadership experienced little difficulty in doing so. This departure had the unexpected consequence of demonstrating that the implementation model can be adapted to certain specific situations without serious disruption of the structure.

Second, orientation briefings did not include all key participants (notably the brigade commander), resulting in considerable confusion and unease about the purpose of the training. Materials were not distributed exactly as directed, which added to the confusion, and ensured that at least some participants would not read and study their materials.

Third, training of roleplayers and interactors was conducted using the normal procedures in place at the simulation center. Consequently, some critical skills were not taught, and little evaluation of the relevant TSP components was possible.

Fourth, although the brigade primary staff members were present as expected, other training audience members (FSCOORD, ADCOORD, engineer battalion commander, and FSB commander) did not participate until well after planning was completed. The ensuing planning process difficulties reinforced the validity of the design intent to involve these high-level personnel during planning, in the minds of the COBRAS developers.

Similarly, at the battalion roleplayer-level, most of the commanders became involved only after most of the battalion planning had been completed. Here the effect was not severe, except that the battalion commanders had little grasp of the purpose of the exercise: to provide training for the brigade staff.

The COBRAS model anticipates that the observers will be peers of the training audience, with comparable levels of experience and expertise. For the trial, several of the observers were one rank lower than the brigade personnel that they worked with, and two of the observers were

relatively naive with respect to the subject matter. However, the observers all had more observer experience than expected, so their lack of experience, expertise, and/or rank-associated credibility were mitigated by their obvious self-assurance in terms of observer responsibilities and authority.

Finally, the Exercise Director himself was filling three other major roles at Fort Riley. A strong COBRAS Coordinator filled the void in routine matters, but most of the expected interactions between the Exercise Director and the brigade commander which would have clarified expectations and training decisions did not occur.

All of these shortcomings in the implementation served to justify many of the design decisions of the COBRAS model, but at the same time, to establish the underlying robustness of the exercise to unit modifications.

Developer observation. COBRAS observers were on hand for each significant event preceding the conduct of the exercise itself, or were in contact by phone. These events included briefings and updates, opening the TSP box and preparation of the materials for the exercise, loading and verifying the BBS tapes, providing advance materials to the S2, interactor and roleplayer training, and rehearsal of the division order brief. During conduct of the exercise, there were 10 COBRAS staff members on hand, each with assigned areas of observation. The interviews, discussions, and questionnaires, along with the less formal conversations, observations, and eavesdropping yielded valuable information to be used in revising the training program or interpreting other findings.

Developer assistance. COBRAS observers had every good intention of assisting only as needed. Assistance was to take the form of pointing to the appropriate TSP materials, then to the appropriate page or paragraph or table if necessary, and only as a last resort to give the answer or perform the required action for the participant. In the early stages, when both the participants and the COBRAS observers were still figuring out what was happening, considerable assistance was provided, probably more than necessary. As the process continued, however, and participants began to grasp their roles and how to use the materials, less assistance was requested, offered, and provided.

Full implementation. The COBRAS model was not fully implemented as intended. Consistent with the model, the brigade and battalion CPs were not placed in the field, but were administratively configured in the simulation center. The unit did not try to operate 24 hours per day, but adhered to 8-10 hour working days (although they continued to work off line on several occasions without the benefit of the observers and feedback).

On the other hand, there were departures:

- One of the four TFs was eliminated, and the brigade sector was adjusted accordingly.
- The training timeline was adjusted (without affecting scenario time) by the brigade commander's decision to use a tactical decision-making model rather than the DDMP as specified; this also caused one AAR to be eliminated.
- The brigade decided to forego the division order brief, opting to receive only the order and the division commander's intent. A resulting lack of understanding of the division plan caused considerable turmoil during the planning process.
- The mission was terminated before the conduct of consolidation and reorganization due to a tight time schedule. This resulted in a significant loss of training opportunity, and the elimination of the consolidation and reorganization AAR.
- Finally, two AARs were combined in order to save time, resulting in one AAR covering a variety of activities and both interim and subsequent products.

This level of departure from the model meant that many of the formative evaluation questions could not be answered, or that the answers were not considered valid reflections on the BSE design, scenario, and the TSP. While the amount of useful and valuable information was considerable, gaps in knowledge still existed after the trial.

The vignettes have not yet been through a formative evaluation trial implementation with a representative audience. Despite considerable interest from several brigades in receiving copies of the vignette materials, no offer of a monitored implementation opportunity has yet been made to ARI.

Methods for Providing Structure in Training

This section focuses on three lessons related to the structure incorporated in the COBRAS program. The first lesson describes structure as created by the tactical scenario; the discussion highlights one objective of the BSE and describes how the structure was influenced by that objective. The second lesson deals with achieving structure through training management procedures and identifies the COBRAS solution to the dilemma. The third lesson describes how other program components (specifically, roleplayer job aids) can facilitate focus on the training objectives; a corollary emphasizes the importance of calibrating the job aids to the abilities of their intended users.

Providing Structure through the Scenario

The lesson relating to the creation of structure via scenario design states the following:

The scenario-based structure must be tailored to the program's objectives.

The VTP battalion-level exercises, for example, provide an environment in which a battalion can perform a designated set of tasks within the execution phase of mission conduct. The domain of tasks for a given mission includes all the tasks associated with the mission execution, given the simulation's capability to support the tasks. To perform all the tasks, the

battalion has to execute the entire mission, from start to finish, according to the scenario's design. The structure that facilitates this performance is created primarily through a well-defined OPFOR plan, specific task organization specifications, and prepared battalion orders to be executed.

Within the COBRAS BSE, the scenario provided structure in a different way. The BSE unlike the VTP, required performance on all mission phases, not just the execution phase. In the BSE, a brigade must prepare its own order during the plan and prepare phases, based on a given division order, and execute that order during the exercise. In terms of providing structure for the training, this meant that, although the exercise can be structured by a planned OPFOR strategy and task organization, it cannot be structured through the provision of a prepared brigade order to be executed during the exercise. Thus, higher-level (i.e., division and corps) orders and prepared messages from higher and adjacent units are responsible for eliciting the majority of the scenario-based structure.

The difference between the two approaches to achieving structure is obvious: Either (a) an executable order is provided, or (b) it is not provided, but must be prepared by the user brigade during the exercise. The question to be answered is, what effect does this have on eliciting performance of the training objectives? Would it be possible to be certain that all performance objectives would be cued, given the seemingly infinite range of possible brigade plans? Or would the range of possible plans result in an unpredictable range of possible performances?

During the development of the VTP, observers noted that almost every battalion modified the provided orders to some extent by issuing fragmentary orders or adjusting the operational plan after the unit crossed the LD (i.e., began the exercise). Nonetheless, they also noted that the exercises usually provided opportunities for the units to perform all of the training objectives (Hoffman et al., 1995; Hoffman, 1997). Similarly, during the COBRAS trial, developers observed that the brigade's own order, which they prepared using division and corps orders, also facilitates performance of most training objectives. In addition, the preparation of a brigade order forced the unit to perform the training objectives associated with the plan and prepare phases of mission conduct.

One might assume that by providing more structuring mechanisms (such as an order to be executed), a program would be better able to support task performance, and thus, its training objectives. The VTP and COBRAS experiences demonstrated otherwise. First, scenario-based structure can be achieved through the provision of various amounts of tactical materials to guide unit operations; both the VTP and COBRAS methods were successful to similar extents. Second, even when more tactical guidance is provided, units may choose to implement their own ideas regarding how to execute a given mission; indeed, most VTP battalion trial executions deviated to some extent from the intended plan.

Providing Structure through Training Management

While the BSE structure is driven to a large extent by a purposefully constructed scenario and supporting tactical products (e.g., division OPORD, INTSUMs), the sustainment of structure during implementation falls primarily under the umbrella of training management. The second lesson regarding structure relates to the development of training management guidance, and states that:

Training management guidance must facilitate quick decision-making about the course of an exercise.

The key training management component in the conduct of the BSE is represented by a "White Cell," composed of seven persons:

- Exercise Director,
- COBRAS Coordinator,
- Blue Forces and OPFOR Controllers,
- simulation site manager (HICON),
- lead EXCON roleplayer, and
- Senior Observer.

Following guidance provided in the TSP, these players, as a group, can compile what is happening in all areas of the exercise and make informed decisions regarding how the exercise might proceed to support the training objectives. Further descriptions of the White Cell are contained in Section 5 of this report.

The need for a systematic and defined mechanism for managing the BSE was conceptualized prior to the first external pilot. During the pilot, COBRAS personnel filled the roles of the key management personnel (Exercise Director, Blue Forces Controller, and Senior Observer) and assisted the EXCON personnel, OPFOR Controller, and simulation site manager. By the end of the pilot test, there was a general recognition that a mechanism greater than the sum of the training manager positions would be required to oversee and direct the exercise.

For example, developers noted that, not only did the OPFOR Controller have to conduct his missions as planned, he also had to obtain information regarding the brigade's activities so that he could alter the OPFOR actions to satisfy the scenario's intent (i.e., the training objectives). This process required coordination between the OPFOR Controller and others such as the Blue Forces Controller and the Exercise Director. Likewise, the Exercise Director, who was the primary decision-maker regarding the course of the exercise, could not observe and collect all the information needed to accomplish these tasks. Instead, he relied on communication with personnel such as the Blue Forces Controller, OPFOR Controller, and EXCON roleplayers to learn what was going on in all areas of the exercise. In sum, each member of what was to be the White Cell was required to participate in a continuing process of collecting, sharing, and analyzing information.

Providing Structure through Standardized Performance by Support Personnel

In addition to the scenario and training management components, a third component helps provide structure in an exercise. This component is represented by checklists, blank forms, and other job aids for exercise support personnel (i.e., roleplayers and interactors). The lesson related to the development of these tools states that:

Job aids are key to maintaining the scenario structure, and thus, to facilitating training objective performance.

Without guidance and job aids for training support personnel (in addition to those involved in training management), the BSE would represent little more than a set of orders, tactical situation materials, and management instructions. A unit would be able to execute the general intent of the training, but there would be no explicit link between the scenario materials and the selected training objectives. Therefore, there would be no guidance to keep the exercise directed toward performance of those objectives. The exercise would quickly become a training event, without structure.

The BSE TSP contains a number of job aids that assist participants in performing their duties during the exercise. The intent of each job aid is to standardize participant actions to generate scenario events that cue the brigade staff to perform certain tasks. These job aids include, for example, workstation task lists for roleplayers, initialization checklists and BBS workarounds for interactors, enemy plan alternatives for the OPFOR Controller, observation task lists for observers, AAR slide templates, and TSP copying and assembly guides for the COBRAS Coordinator.

A corollary to the lesson emphasizes the care required in construction of job aids. As always, the job aids must be designed for, and tested with, their intended users. A job aid that cannot be understood by the user, or that provides no benefit, is not an aid. This is not a COBRAS lesson learned; it is an instructional principle that bears repeating.

Maximizing Training Benefit

This lesson states that:

> *Training programs should maximize and then clearly state the benefits attainable for all participants.*

Programs that are designed for a specific audience may actually be valuable for other participants as well. This value should be emphasized in the TSP.

The COBRAS intent, as stated in the SOW (U.S. ARI, 1994), was to design and develop a training program for " . . . the brigade commander and primary staff, and supporting elements such as fire support, air defense, engineer, and logistics." After exhaustive research, analysis, and weighing of options, developers designated 11 individuals as the training audience. All personnel who interacted directly with those individuals would be characterized as "roleplayers" or "supporting staff," whose activities would be either in direct response to the training audience, or planned and scripted to some extent. These roleplayers and supporting staff would most likely be played by the role incumbents; that is, actual battalion staff would man the battalion cell, and so on. This would ensure that the roleplayers and supporting staff were knowledgeable, that habitual relationships were maintained, and that additional training value could be provided beyond the primary training audience of 11.

As the exercise took shape, the project team found that a minimum of 103 personnel would be required, in addition to the designated training audience of 11. They included:

- 3 administrative persons,
- 36 BBS interactors (2-3 per station—the normal requirement for a BBS exercise),
- 6 observers,

- 38 roleplayers (including the OPFOR Controller), and
- 20 supporting staff in the brigade or in the subordinate and supporting units.

Although there was obvious direct training value for at least 63 of these participants (Blue Forces roleplayers, observers, and supporting staff), and indirect value for the interactors and the administrative persons, developers were initially reluctant to refer to them as "training audience members" because: (a) the SOW (U.S. ARI, 1994) specified that the training audience was brigade staff, and (b) there were no task lists, designated observers, or AAR plans for these individuals.

As time went on, developers initially failed to recognize the consequences of the rigid definition of the "training audience." The notion remained that the COBRAS exercise required a ratio of 103 "training aids" for 11 training audience members (as opposed to 39 training aids for 75 training audience members). When the roleplayers and supporting staff were later characterized as participants, and the 11 brigade staff members were referred to as "primary training audience," it was possible to better convey the level of active participation in the training and the advantages of using the program.

Accounting for User Needs in Training Program Design

This lesson states that:

> *Developers should be aware of the expectations and needs of prospective users, and determine when these may be in conflict with other development requirements. A balance should be achieved between the two.*

If a training unit wants a program to help them prepare for the challenge of NTC rotations, they have formulated a very specific agenda: They want a scenario that resembles an expected NTC scenario, and they also want to use their own task organization, TACSOP, decision-making process, and other unit-developed solutions (e.g., communications system structure, organization of CPs). If, however, they have many new staff members who need to quickly become accustomed to working together, they will care less about the specifics of the METT-T, and more about the types of situations that the staff confronts in the exercise.

The COBRAS programs are based on the assumption that METT-T is a driver, just as the simulation may be a driver. The premise for this level of training is that units need to be prepared to perform their functions in a variety of situations.

Achieving a balance between perceived user needs and "big picture" needs (as perceived by higher echelons, training strategists, and scientists) is not an easy task. It requires careful attention to all levels of needs analysis, early in development, in order to design a program that can be both structured (a focus on tasks, along with the cues and conditions to elicit task performance) and flexible to unit characteristics and training needs.

In the BSE's pilot and trial, the COBRAS project turned out to be surprisingly robust with respect to METT-T alterations. Any METT-T change will require that corresponding changes be made throughout the TSP, in order to retain the exercise integrity. This can be a daunting task for brigade staff members who are confronting the TSP for the first time (program developers have much less difficulty recalling where trickle-down effects will occur). But a program that has

such flexibility built in, or that addresses a stated training need at the start, has a better chance of being of use to units.

Alternative Training Strategies

Two training value-oriented issues surfaced in the preparations for implementing the COBRAS BSE in the pilot and trial: conduct of 24-hour operations and employment of CPs in the field. On a more general level, these features are representative of a set of "realism features" that are often considered desirable in large-scale collective training exercises. The lesson states that:

> *Decisions on incorporating realism features, such as 24-hour operations or field CPs, into a training program should be based on the program training objectives, and consistent with enhancing the value of the program.*

For the COBRAS program, developers decided not to implement either 24-hour operations or field CPs. The decision was both practical (the cost of high intensity realism features in terms of personnel requirements) and training objective focused. Neither feature was seen as likely to enhance the value of a program focused on cognitive processes and staff activities from planning to reorganization. If the primary staff personnel are the exercise's focus, then they should be at the center of every activity, rather than being represented by other section members. On the other hand, if a program's objective is to train the interaction and communication that has to take place between CP shifts, then conducting 24-hour operations becomes a more logical option.

COBRAS training can be conducted with field CPs, but the option is not recommended. Field CPs require the costs of deploying CPs, wear and tear on equipment, and an expanded logistical effort to fuel, feed, and support CPs. In addition, employing field CPs does not create the best learning environment. The size and distances between CPs place additional communication burdens on observers, and good AAR settings are often not available. Both detract from the provision of feedback to the unit. Positive aspects of employing field CPs revolve around the capability to train CPs setup and maintenance operations, and the associated logistical functions. Finally, field CPs may increase the perceived realism of the training.

In both of these cases, basing the decision on the training focus increased the likelihood that the focus would not be diluted.

Fielding, Sustaining, and Maintaining Structured Simulation-Based Training Programs

Regardless of the potential value of a training program, it is of no benefit if it is not implemented. COBRAS training was intended to be exportable to the extent that the simulations are available. The lesson states that:

> *The Army must design and implement the mechanisms required to field, sustain, and update structured training programs, just as it does for operational systems and training devices.*

This should include specifying how training programs will be distributed to units, and how the programs should be implemented. It might also include the provision of a dedicated support

team to manage the TSP and facilitate training. Finally, it must include a mechanism for maintaining the doctrinal currency of the programs and for incorporating TSP lessons learned through future implementations.

These are not new ideas; all are addressed in the recent publication, TRADOC Regulation 350-70 (in preparation). One point, however, deserves special discussion. The COBRAS training was designed to be implemented without the benefit of any assistance from a dedicated training support team. Results of the COBRAS formative evaluation of the BSE indicate, however, that this may not be feasible. For instance, one unit commented that they probably could not have executed the training without the support provided by the development team.

The functions of a dedicated support team would be performed with brigade and division leaders and simulation site staffs. Those functions would include:

- providing information on the purpose and value of the training,
- explaining how the program is to be implemented,
- describing the participants and their roles and responsibilities (both in preparation and execution),
- updating the program according to changes in doctrine or training agendas, and
- filling key roles themselves (such as observer or Exercise Director positions).

Without a support team that can perform at least the nonparticipant activities listed above, units are unlikely to use structured simulation-based training programs. This would be unfortunate given the Army's apparent desire to employ structured simulation-based programs.

Conducting Effective Formative Evaluation Pilots and Trials

A successful formative evaluation pilot or trial should produce an implementable program that conforms to the specifications of its stakeholders. Two lessons are critical. The first lesson states that:

> *The evaluation design should involve experts in evaluation, training program developers, and development team leaders.*

Each of these individuals should be involved on a working level in planning and preparing for the formative evaluation pilots and trials:

- The evaluation experts should be intimately involved in the program design and development processes. Without the knowledge obtainable only through involvement in the design process, the evaluation designers are at a loss to track the aspects of the program that need assessment or attention.
- Developers who will be involved in evaluation activities should be educated as to the concept and purposes of formative evaluation early in the project. This will facilitate their willing involvement in the process of preparing for the formative evaluation.
- Development team leaders should be proactive in determining the focus and objectives of the formative evaluation. This will produce a relatively seamless development-formative evaluation process.

The second lesson learned concerning formative evaluation pilots and trials states that

Product development schedules should include planning the formative evaluation.

The formative evaluation strategy should be planned well in advance of any product tryouts. In fact, conceptualizing the formative evaluation pilots and trials within the long term examine-evaluate-refine process should help developers to set aside energy and time to plan all of the formative evaluation activities.

Within the development schedule, sufficient time and resources should be allocated to the design of formative evaluation instruments for pilots and trials. It is these instruments that will facilitate the goal of determining the consistency with program objectives and the value of the training. Without them, much information is likely lost during the hectic tryout exercises.

Summary

This section has presented and discussed some of the major lessons learned from the COBRAS formative evaluation efforts. Some of the lessons were based on direct feedback from pilot test and trial implementation participants, while others were based on observations of the implementations. Lessons were noted during all phases of the project, from the initial design through implementations.

The final section in this report describes some issues that remain to be addressed. Some, such as the COBRAS II program, are underway already. Others will be likely to demand attention in the near (5 year) future, if the U.S. Army is to continue with steady progress toward its Force XXI goals in training and readiness.

SECTION 11: FUTURE DIRECTIONS

As the COBRAS project draws to a close, there are a number of issues to highlight. Some should be on the short list of things to consider for future development efforts. These issues represent questions that have not been answered and relate to:

- the value of structured training programs and TSPs,
- the need for innovation in creating effective TSPs, and
- the need for program flexibility.

The Value of Structured Training Programs

When lessons learned from the VTP development efforts are added to the consideration of the perceived value of the BSE, the implication is straightforward: Unit (collective) structured training with strong TSPs can be valuable to both AC and RC units.

The perception of training value is drawn from results of the trial implementation of the BSE. To complete the formative evaluation of the COBRAS BSE, it was necessary to ask the question, "How does the training fulfill the needs of AC brigades?" This went beyond determining if the project objectives were fulfilled; it dealt directly with examining the accuracy and appropriateness of the concepts that drove the training's design. The evaluation also focused on determining the uniqueness of the COBRAS training and the benefits facilitated by the individual program components. After the trial of the COBRAS BSE, developers examined their observations and the feedback provided by the participating unit.

The overall participant assessment of the training during the August BSE tryout was that it was beneficial. Some participant feedback obtained suggested that the COBRAS training offered no more (but no less) value to AC brigades than the typical unit-designed and implemented BBS exercises (but at a lower cost to the unit).

Based on participant comments, the utility of the BSE resides particularly in four aspects of the training, each of which can be used for modeling future programs:

- brigade staff task lists,
- reduced preparation,
- frequent AARs, and
- robust CSS information and play.

Brigade Staff Task Lists

The purpose of the COBRAS brigade staff task lists is to facilitate performance observation, thereby assisting in the provision of feedback to help the unit improve its staff processes. The tasks represent macro-level statements of performance requirements. They indicate performance by specifying selected activities, outcomes, or products of the staff process for each individual in the primary training audience. They do not attempt to indicate how the entire staff process should be performed. They are neither limited to what is contained in doctrinal manuals, nor fully representative of those contents.

Several participants found the lack of direct correspondence between the task lists and doctrinal materials disquieting. It seemed logical that, as both the lists and the ARTEP-MTPs and FMs address the same individuals' performance in the same situations, it should be possible to establish a crosswalk.

However, a closer look at the structures and purposes of the two kinds of documentation sheds light on the seeming disconnect. The ARTEP-MTPs were not constructed to support process-oriented training like COBRAS. For instance, MTP 71-3 (DA, 1988) does not clearly show how the S2's activities support the brigade decision-making model. The new draft of the same MTP (DA, 1996) is no different in this respect. The existence of the COBRAS tasks, however, gives a training unit something they can use in addition to the MTPs to assess and improve their performance. The COBRAS tasks use a relatively chronological approach to describe the DDMP, an MDMP, and the development of orders. This sequencing led to the identification of the process and behavioral details that have to occur. Each process is presented not in general terms, but in terms of how it is operationalized at different stages of the overall staff process, for each training audience member, and within a specific METT-T.

Reduced Preparation Time

Another source of estimated value lies in the reduced preparation time. This represents the turn-key nature of the COBRAS program. The division orders and tactical products obviate the need to develop, wargame, write, and produce the division and corps orders and tactical products, which are the major cues for brigade staff planning. The prepared messages provide the major events and additional cues needed to make the scenario successful. If a brigade staff wants to spend their allocated training time on internal staff processes, then using prepared products, such as those listed above, is an appealing solution.

Frequent After Action Reviews

The COBRAS BSE calls for multiple AARs to be conducted throughout the course of the training in lieu of the consolidated AAR that is common at the end of staff exercises. During the August BSE trial, COBRAS developers observed that the benefits of conducting multiple AARs outweighed any disadvantages communicated by the training audience. Disadvantages focused on the perception that frequent AARs interrupted the staff process. Participant comments regarding benefits of COBRAS AARs suggested that:

- Frequent AARs were helpful in capturing lessons throughout the training.
- Multiple AARs allowed for more focus on staff actions and products than do normal BBS exercises or NTC rotations.

Observations and conversations indicated that the participating staff was able to focus on their staff processes more than they would have if they had conducted just one AAR at the conclusion of the exercise.

Combat Service Support Play

As stated earlier, one significant feature of the COBRAS BSE is the focus on CSS play. This focus was achieved by designing the three missions to be conducted successively. For example, during the final phases of the MTC, a unit initiates planning for the AD mission, and then conducts the AD. Because the forces are not reinitialized on the simulation, the unit has to

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conduct CSS operations that will resupply the brigade for the AD mission. In addition, the storyline states that the MTC mission begins after the notional conduct of an FTX. Thus, the unit must begin the MTC in a degraded status that requires CSS play.

Because the BSE trial brigade conducted only the MTC mission, the exercise did not really assess the quality and effectiveness of the logistics aspect of the training. Even so, the training participants indicated their belief that the two missions conducted together would force training in CSS functions.

To conclude, the BSE pilot and trial results indicate that each of the above factors contributed to a different kind of training experience for the staff, and that this is what they needed. Indeed, one officer stated, "I think this is exactly what we needed at this point in our glide slope to NTC." Again, this estimate of the value is based on a focus on the brigade staff processes, free from the restrictions of having to prepare for the restricted METT-T of an NTC rotation. The COBRAS BSE may represent a training experience that is different from what the unit would have designed for itself; but it may be one that better serves the needs of a unit that has a relatively new staff and has yet to solidify its staff processes and interactions.

As there was no tryout of the vignettes by personnel representative of the intended users, it is difficult to determine the specific value of the individual vignettes, or to compare their value to other types of training. During the COBRAS project, several brigades, including an ARNG unit, expressed interest in obtaining the vignette materials. To this point, though, no unit has offered to serve as a test-unit for their evaluation.

In the absence of data, speculation is premier. It seems reasonable to assert that the value of the vignettes will stem first from their purpose: to train small groups of brigade staff personnel in the processes performed during individual mission events. The training focuses on staff interaction and the production of products, as does the BSE. In this way, it is unique from other brigade-level programs. The vignettes were also intended to be low-overhead, turn-key training events that can be executed, in general, without simulation support. Minimal preparation and support requirements are contributors to their value. Finally, vignette design suggests that the brigade XO serve as the training coordinator, facilitating the in-house staff development process.

The Content and Acceptability of the Task Lists

The debate continues regarding the content of the COBRAS brigade staff task lists and how they should be used. Although the COBRAS task lists were created to facilitate performance observation, they were also distributed to training audience members to generate an understanding of what observers would be monitoring. This concept is sound, but perhaps the content of the COBRAS task lists did not meet the need. The general sentiment of the training participants, including observers, was that the task lists were not presented in sufficient detail to be useful during the exercise. Some said that the task lists should at least contain references to the appropriate MTPs that would contribute more detail. COBRAS developers, however, felt that the task lists were already more detailed than the MTPs, and served to describe the processes that are observed in the training. The task lists were not meant to replace the MTP or provide a new TTP set.

It took a great deal of time and effort to compose the COBRAS task lists as they currently exist. It was acknowledged during the development process that the task lists do not delve into

the "how" of performing COBRAS tasks. The tasks focus only on the "what." The COBRAS staff intended to identify only "observable" tasks or products that would demonstrate that certain activities had occurred. It was reasoned that by noting the performance of observable tasks, the observers and training unit would then be able to discuss the reasons why the tasks were either performed or not performed.

In the August trial, observers said they could have used the task lists better if they had provided task conditions, standards, and doctrinal references. Future development efforts may attempt to further specify the "how" of task performance. This could be achieved, in part, through the presentation of sample brigade staff products to help observers assess whether or not the brigade's products are complete in terms of content. But this is not a complete or fully useful answer. Some products may be useful. Other, such as a complete brigade order, are not. This type of product requires too much time to digest, would reflect a different commander's concept, and would not support the provision of feedback.

Whether or not to distribute task lists, and what kinds of task lists, to the training audience should also be examined. If the detail representing the "how" is present in the task lists, then providing the lists to the training audience may be beneficial. COBRAS training, however, was not designed to teach a brigade staff how to conduct the process before they participate in the BSE; providing initial training is inconsistent with the turn-key concept. The training was designed to provide a practice opportunities. Additionally, the lists will likely become extremely long and cumbersome.

It was observed, however, that both observers and training audience members used the task lists as reminders of the expected performances, before each of the exercise segments. This may represent a more user-friendly approach to providing task detailing. Another proposed modification was that task lists provide even less detail, that tasks be grouped at an intermediate level, closer to but still below the segment level (e.g., wargaming).

The Need for Innovation in Creating Effective Training Support Packages

Brigade-level structured simulation-based training programs are complex in nature and therefore can require the dissemination of great amounts of information to large numbers of exercise participants. However, brigade staff officers do not have an excess of time available for training, and especially for training preparation responsibilities. The structured programs and well-constructed TSPs should bring skills training back within reach of harried commanders. To be useful, however, TSPs have to communicate only the most vital information with the requirement of minimal reading. Because soldiers are not likely to persevere through long reading and study assignments, multimedia platforms and software that mix presentation modalities and offer interactive exploration may stimulate more interest in the information and, consequently, create more involvement in the exercise.

The Need for Program Flexibility

From feedback collected at the August tryout of the BSE, the developers concluded that the unit wanted a turn-key program, but one that they could tailor in terms of training audience, event or function focus, and task organization. These two goals at first appear to be incompatible: structure implies a degree of rigidity that does not lend itself to tailoring.

However, the experience at the trial also indicated that the scenario and TSP are remarkably robust with respect to structural changes. The exercise does not completely unravel and fall apart, the tasks are still caused to occur, and training and learning happen. But the training program characteristics that enable flexibility have yet to be defined and worked into the methodology for developing structured simulation-based training.

Summary of Lessons and Implications

The lessons learned during the COBRAS project (recorded in Section 10 and this section) are both provocative and generalizable, especially as the Army focuses on the development of structured simulation-based programs for brigade-, division-, and corps-level personnel. By addressing the validity of the development methodology (Campbell et al., 1995), this report has verified that the development activities are applicable to higher-echelon training, as well as platoon, company and battalion training. The lesson also demonstrates the importance of assessing programs by conducting a formative evaluation with representative user units.

The sections also discuss several issues regarding the process of designing training. These include maximizing training benefit through expanding training objectives, accounting for user needs and expectations by maximizing audience participation, and examining the benefit of some alternate design strategies. The lessons also discuss the characteristics of a usable TSP and improvement of formative evaluation efforts.

To illustrate the future possibilities of developing brigade-level training programs, the lessons also discuss the estimated and observed value of the COBRAS vignettes and BSE, and what the Army needs to do to facilitate structured simulation-based training program implementation in the Army. The report concludes by presenting some issues that were debated during the COBRAS project, but were not decided or implemented due to contractual limitations. Further consideration of these issues may serve to enhance the model that the COBRAS project has created.

The Next Step: COBRAS II

Even as the COBRAS development was approaching the external pilot implementation (in December 1995), gaps in the program had been identified and work had begun on providing solutions. The first and most glaring need concerned the training audience. As discussed in Section 10, there was some initial resistance to staging a training exercise with a cast of 103 to train 11. Although the resistance evaporated when users saw the obvious training benefit to the other participants, the next question concerned elevating those participants to full training audience status.

Within the COBRAS work, the "primary training audience" was operationally defined as those participants for whom:

- training objective task lists would be generated,
- observers would be assigned, and
- AARs would be provided.

This effort for the 11 designated primary personnel consumed the COBRAS staff for the better part of a year. But it also provided the basis for expanding the exercise during the next

year. The COBRAS II work is very much like the original COBRAS, with three principal differences in design and development:

- Additional training audience include the brigade chemical officer, the brigade signal officer, the DS military intelligence company commander, the military police platoon leader, and the Army aviation liaison officer.
- The scenario METT-T was to be essentially congruent with that of COBRAS; however, it was immediately obvious that it would require modification to include events that would provide the cues for the additional training audience members.
- Because of time constraints and the essentially common scenario, the SPA process would not be repeated. Instead, the existing COBRAS task lists would serve as the organizing structure. Tasks would be added for the new training audience, for the interactions between the original training audience members and the new ones, and for activities of the original training audience in response to the added scenario events.

As with COBRAS, both a BSE and vignettes would be developed. The TSPs for both types should again be completely exportable. Two vignettes should focus on the links between brigade and battalion, including battalion members as part of the vignette training audience. While the original vignette would likely look different from the new vignettes (because of improvements in organization and presentation), both sets would still be viable. The COBRAS BSE, however, would exist only as a historical novelty; COBRAS II BSE would be the version made available to brigades and divisions.

Summary

The purpose of this report was to describe the development of the COBRAS brigade-level training exercises and to offer lessons learned to the military training development community. The report began with a project introduction focusing on the project's background in terms of its relationship to the FXXITP. It then identified the project's objectives, scope, and development methodology.

The formative evaluation strategy was then presented. It presented the concept of formative evaluation and described the methods for quality assurance that were utilized during the project. The report then progressed to lay out the design parameters and the thought processes used to design the program. In the same section, the report discussed the identification of training objectives through the SPA process and the development of the scenario. Descriptions of the BSE and vignettes architectures concluded the design and development section of the report.

Several sections then detailed the major formative evaluation activities that occurred during the latter stages of the project: the pilot tests, quality assurance reviews, and trial implementation. These sections describe the TSP versions as they existed at the time of the events, and also summarize actions taken as a result of the information collected.

The report concludes by presenting lessons learned during the course of the project. The lessons have a general applicability and highlight the important issues that surfaced during the program's design, development, and formative evaluation.

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Appendix

ACRONYMS and ABBREVIATIONS

AA	Assembly area
AAR	After action review
AC	Active Component
ACA	Air coordination area
AD	Area defense
ADA	Air defense artillery
ADCOORD	Air Defense Coordinator
AGMB	Advance Guard Main Body
AI	Area of Interest
ARI	Army Research Institute
ARNG	Army National Guard
ARTEP	Army Training and Evaluation Program
ASAT	Automated Systems Approach to Training
ATK	Attack position
AWE	Army Warfighting Experiment
BAS	Battalion aid station
BBS	Brigade/Battalion Battle Simulation
BF	Battlefield Function
BHO	Battle handover
BOS	Battlefield operating system
BSA	Brigade support area
BSE	Brigade Staff Exercise
C2	Command and control
C3	Command, control, and communication
CAC	Combined Arms Center
CAS	Close air support
CBS	Corps Battle Simulation
CCF	Critical Combat Function
CCTT	Close Combat Tactical Trainer
CGSC	Command and General Staff College
COA	Course of action
COBRAS	Combined Arms Operations at Brigade Level, Realistically Achieved through Simulation
CP	Command post
CRP	Combat reconnaissance patrol
CS	Combat support
CSS	Combat service support
DATK	Deliberate attack
DC	Dislocated civilian
DDMP	Deliberate decision-making process
DISCOM	Division support command
DIVARTY	Division artillery

DRC	Division response cell
DS	Direct support
DST	Decision support template
DTG	Date/time group
ENDEX	End of exercise
EXCON	Exercise control
FA	Field artillery
FM	Field Manual
FSB	Forward support battalion
FSE	Forward security element
FSO	Fire Support Officer
FSCOORD	Fire Support Coordinator
FTX	Field training exercise
FXXITP	Force XXI Training Program
G1	Division Adjutant
G2	Division Intelligence Officer
G3	Division Operations Officer
G4	Division Logistics Officer
GCM	Graphic control measure
HICON	Higher control
HPT	High payoff target
HumRRO	Human Resources Research Organization
INTEL	Intelligence
INTSUM	Intelligence summary
IPB	Intelligence preparation of the battlefield
IPR	In-progress review
ISP	Initial situation package
KIA	Killed in action
LD	Line of departure
LOI	Letter of instruction
MDMP	Modified decision-making process
METL	Mission-essential task list
METT-T	Mission, enemy, terrain, troops, and time available
MLRS	Multiple Launch Rocket System
ModSAF	Modular Semi-Automated Forces
MOA	Memorandum of Agreement
MOS	Military Occupational Specialty
MTC	Movement to contact
MTOE	Modified Table of Organization and Equipment
MTP	Mission Training Plan
MWSTC	Mounted Warfare Simulation Training Center
NAI	Named area of interest
NBC	Nuclear, Biological, Chemical
NSC	National Simulation Center
NTC	National Training Center
O/C	Observer/Controller

OPFOR	Opposing force
OPORD	Operations order
OPSTATE	Operational state
R&S	Reconnaissance and surveillance
RCVTP	Reserve Component Virtual Training Program
ROM	Refuel on the move
S1	Adjutant
S2	Intelligence Officer
S3	Operations and Training Officer
S4	Supply Officer
SAB	Separate Armor Brigade
SIMBART	Simulation-Based Mounted Brigade Training Program
SIMNET	Simulation Networking
SIMUTA-B	Simulation-Based Multiechelon Training Program for Armor Units - Battalion Exercise Expansion
SME	Subject matter expert
SOP	Standard operating procedure
SOW	Statement of Work
SPA	Staff Performance Analysis
ST	Student Text
STARTEX	Start of exercise
TAC	Tactical CP
TACSOP	Tactical standard operating procedure
TADSS	Training aids, devices, simulations, and simulators
TF	Task force
TOC	Tactical Operations Center
TOE	Table of Organization and Equipment
TRADOC	U.S. Army Training and Doctrine Command
TSP	Training support package
TTP	Tactics, techniques, and procedures
USAARMC	U.S. Army Armor Center
USAARMS	U.S. Army Armor School
USATSC	U.S. Army Training Support Center
VBTP	Virtual Brigade Training Program
VTP	Virtual Training Program
WARNO	Warning order
WARSIM	Warfighters' Simulation
XO	Executive Officer